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THE RUBBER AGE AND TIRE NEWS

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The Effect of Compounding Ingredients on the Physical Properties of Rubber

By C. Olin North

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It is generally realized that the compounding of rubber is more or less of an art. It depends solely on a large number of uncorrelated and apparently unrelated facts. It is hoped that in time this art will become a science with facts, theories and laws so well substantiated that guess work and experiments will be reduced to a minimum.

Before this ideal condition can be attained both rubber testing and compounding must make considerable progress. Tensile strength and ultimate elongation are important but tell only a very small part of the whole story. Tests are needed which will give us true measures of hardness, toughness, plasticity, resiliency, internal friction, hysteresis, and many other properties.

The purpose of this paper is to present some data as to the effect of certain common compounding ingredients on rubber and to propose a method of visualizing the peculiar behavior of these substances.

It should be mentioned in the beginning that the tests on which this work is based are very crude from the standpoint of scientific accuracy but it is believed that the values obtained, the curves, etc., are relative and as such will be more or less of interest to other rubber technologists.

Compounding Experiments

It was realized in the beginning that the usual weight method of compounding was not only valueless but misleading. Consequently a basis of 100 volumes of rubber was chosen to which were added volumes of the different fillers varying from zero to fifty.

In the first experiments it was thought desirable to use a small quantity of accelerator, for which purpose thiocarbanalide was selected. Later this practice was discontinued and in all but two of the experiments (barytes and zinc oxide) described below, no curing agent other than sulphur was employed. A selected grade of pale crepe was used with all fillers except barytes. Stocks were prepared on small experimental mixing rolls and sheets were vulcanized in the usual manner, in molds maintained at 140 deg. C in a hydraulic press. Physical tests were performed on a Cooey testing machine.

Some years ago Dr. Warren K. Lewis called our attention to the fact that we were measuring tensile strength at the expense of ultimate elongation. In the present methods of testing, tensile strength is figured on the area of the test piece under no load. This is very unfair to a stock high in rubber since the actual area at break is considerably smaller than the original area and the relative decrease in cross section of a soft stock is much greater than for one heavily loaded.

Assuming that the volume of a stock remains constant throughout elongation, it can be readily shown that the tensile at break can be arrived at by multiplying the tensile strength figured on the area at rest, by the final length and dividing by the original length. Thus,—

Let L = the load necessary for rupture
W = width of a test piece before stretching
d = distance between the marks
t = thickness of the test piece
V = the volume = wdt
T = tensile figured on cross section at rest
T^1 = tensile at break
Let $w^1d^1t^1$ and V^1 represent the respective dimensions at break
Since $V = V^1$ by assumption, then $wdt = w^1d^1t^1$

$$T = \frac{L}{wt} \qquad T^1 = \frac{L}{w^1t^1}$$

$$\therefore Twt = T^1w^1t^1$$

and

$$T^1 = \frac{Twt}{w^1t^1} \qquad \text{But } wdt = W^1d^1t^1$$

$$\therefore \frac{wt}{w^1t^1} = \frac{d^1}{d}$$

Substituting $T^1 = \frac{T \times d^1}{d}$

Unfortunately the volume of a test piece does not remain constant during elongation as has been shown by Schippel.* Consequently a correction factor should be used if absolute accuracy is desired.

Another method of taking into account the decrease in area and the corresponding increase in length is by Stevens' "tensile product," which is obtained by multiplying the ultimate elongation by the tensile strength as usually calculated. When dealing with hard rubbers where the elongation is practically zero, this method is absurd since the tensile product becomes zero. However, on soft stocks it is a satisfactory unit of comparison. It is convenient when working in English units to divide by 10,000. Tensile product is a less logical method of attack than tensile at break but since the curves, when plotted against volumes of filler, are parallel and the former is rather generally used by rubber technologists this unit was chosen for the comparisons given below. Correction factors are necessary for absolute accuracy as in the case of tensile at break, but in our experiments we did not use them partly because of the small error introduced by volume change of the test piece and partly because of the little known to date about this phenomenon.

In order to ascertain the effect of the different fillers on the rubber, the device of figuring tensile strength, ultimate elongation and tensile product back to the actual volume of rubber present was tried out and found to be of value.

The present state of compounding demands a simple pro-

* Read before the Rubber Division at the St. Louis meeting, American Chemical Society, April 12-16, 1920.
E. L. Davies, and Dr. W. K. Lewis for many ideas and suggestions which have been incorporated into this paper.

* Ind. and Eng. Chem., Vol. 12—1 P. 33.

TABLE I.
DATA ON BARYTES (Ground White).

Ratio vol. Barytes to 100 vol. Rubber	—(1 per ct. by weight)— Rubber	BaSO4	S	Thio-carban-ilide	(per ct. by vol.) Rubber	BaSO4	Best cure @ 40 No. steam	Tensile strength lbs. sq. in.	per ct. Elong.	Permanent set per ct.	Tensile product T x E. / 10,000	(Values corrected back to 100 volumes of rubber). Tensile strength lbs. sq. in.	Elong. per ct.	Tensile product
0														
.5	89.5	2.03	5.58	2.79	99.5	.5	1 hr. 45 min.	1805	925	10	167	1820	930	168
1.	87.7	3.99	5.48	2.74	99.	1.	1 hr. 55 min.	2065	975	10	202	2090	986	204
2.	84.5	7.66	5.28	2.64	98.1	1.9	1 hr. 35 min.	2055	988	10	203	2090	1005	207
3.	81.3	11.09	5.06	2.53	97.1	2.9	1 hr. 55 min.	1790	950	10	170	1841	988	175
6.	73.2	19.9	4.58	2.29	94.4	5.6	1 hr. 55 min.	1712	950	10	163	1820	1005	173
8.	68.6	24.95	4.29	2.15	92.6	7.4	1 hr. 55 min.	1960	975	10	191	2120	1050	206
11.	62.6	31.5	3.92	1.96	90.1	9.9	1 hr. 45 min.	1732	950	15	165	1930	1055	183
15.	56.3	38.4	3.52	1.76	87.0	13.0	1 hr. 45 min.	1805	950	20	172	2080	1090	198
20.	49.9	45.45	3.12	1.56	83.4	16.6	1 hr. 45 min.	1695	900	20	153	2030	1080	184
25.	44.8	51.	2.8	1.4	80.	20.	1 hr. 45 min.	1638	925	25	151	2040	1158	189
30.	40.1	56.1	2.51	1.26	76.9	23.1	1 hr. 45 min.	1398	825	25	115	1820	1075	150
35.	37.2	59.2	2.36	1.18	74.1	25.9	1 hr. 35 min.	1328	788	25	105	1790	1060	142
40.	34.4	62.3	2.19	1.1	71.4	28.6	1 hr. 45 min.	1325	788	30	104	1860	1105	146
45.	31.8	64.9	2.18	1.09	68.9	31.1	1 hr. 35 min.	1332	738	25	98	1935	1070	142
50.	29.55	67.6	1.88	.94	66.7	33.2	1 hr. 45 min.	1300	713	35	93	1950	1070	140

cedure whereby fillers can be compared with regard to their effect on rubber regardless as to how that effect is produced.

Assuming that the effective area is that obtained by subtracting the area occupied by the particles of filler from the total area of the test piece one can refer the test back to the proportional quantity of rubber present by dividing the figure by the percentage by volume of rubber and multiplying by 100. For example, referring to table 4 we find that the stock containing 25 volumes of magnesium carbonate to 100 volumes of rubber (80% rubber and 20% $MgCO_3$ by volume) has a tensile strength of 2670 lbs. per sq. in. The ultimate elongation is 630% and the tensile product 168. Correcting these values to the relative quantity of rubber present by multiplying them by 100 gives 3340 lbs. per sq. in. as the corrected tensile, $\frac{\quad}{80}$ 778% corrected elongation, and 210 as the corrected tensile product. The term "corrected" which is used throughout the

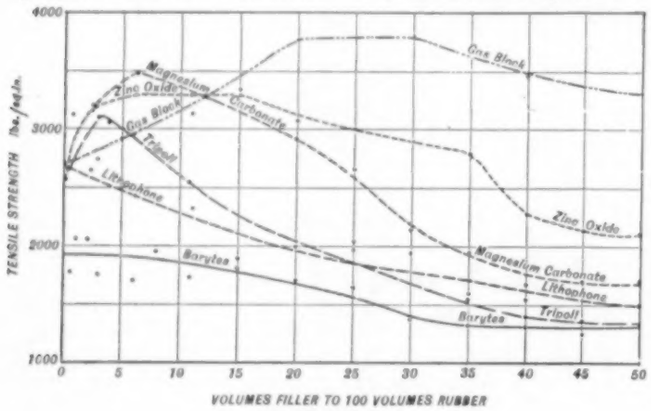


FIG. 1

paper always indicates that the value has been corrected back to a basis of 100 volumes of rubber.

Complete data of the various experiments is recorded in tables 1 to 6 inclusive. This information has been reduced to curves. Fig. 1 to 7 inclusive.

Barytes—You will note that this filler causes a continuous decline in tensile until 35 vol. to 100 of rubber is reached.

Lithophone—This filler also causes a decided falling off in tensile.

Tripoli—Infusoral earth, etc. shows a maximum above 3000 per sq. in. at 3 vol. to 100 vol. rubber after which there is a decided falling.

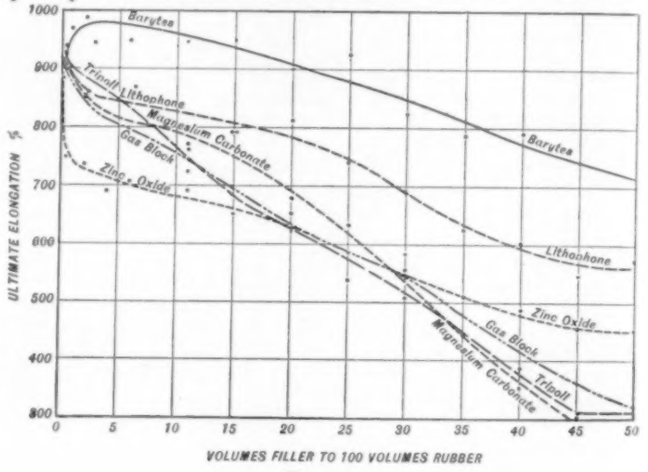


FIG. 2

Zinc Oxide—The variety used here was New Jersey Red XX. You will note that its curve comes up to a flat at 5 vol. to 100 vol. of rubber remains constant until 15 vol. and then falls gradually until 35 vol. is reached. Beyond this point the fall is rapid.

Magnesium Carbonate—This filler comes up to a maximum at 6 vol. to 100 vol. of rubber and then falls off gradually.

Gas Black—The curve rises gradually to 20 vol., remains constant until 30 vol. and falls off slowly.

Ultimate Elongation, Fig. 2

Barytes—This filler stands out over all the others as having least effect on the elongation.

Lithophone—Is next to barytes.

Magnesium Carbonate, Gas Black and Tripoli—These all produce about the same falling off.

TABLE II.
DATA ON TRIPOLI.

Ratio vol. tripoli to 100 vol. rubber	—(per ct. by weight)— rubber	Tripoli	sulfur	(per ct. by vol.) Rubber	Tripoli	Best cure at 40 No. steam	Tensile strength lbs. sq. in.	per ct. Elong.	Permanent set per ct.	Tensile product T x E. / 10,000	Values corrected back (to 100 volumes of rubber). Tensile strength No. 1 sq. in.	Elong. per ct.	Tensile product
.5	90.8	.91	8.27	99.5	.5	2 hr. 30 min.	2660	913	13	243	2670	918	244
1.	90.1	1.79	8.19	99.	1.	2 hr. 45 min.	2775	900	15	249	2800	910	251
3.	86.9	5.17	7.9	97.1	2.9	2 hr. 45 min.	3110	875	15	272	3200	900	280
6.	82.6	9.85	7.5	84.4	5.6	2 hr. 45 min.	2960	850	25	252	3140	900	269
8.	80.	12.7	7.26	92.6	7.4	2 hr. 45 min.	2810	813	20	228	3030	876	246
11.	76.3	16.8	6.95	90.1	9.9	2 hr. 15 min.	2530	725	25	183	2800	804	203
15.	71.9	21.5	6.54	87.	13.	2 hr. 30 min.	2275	700	20	159	2620	805	183
20.	67.1	26.7	6.11	83.4	16.6	2 hr. 45 min.	2000	625	35	125	2400	750	150
25.	62.9	31.3	5.72	80.	20.	2 hr. 30 min.	1985	538	35	107	2480	670	134
30.	59.3	35.4	5.4	76.9	23.1	2 hr. 15 min.	1700	588	42	100	2210	765	130
35.	56.	39.	5.1	74.1	25.9	2 hr. 45 min.	1550	450	35	70	2090	608	94
40.	51.5	43.9	4.69	71.4	28.6	2 hr. 15 min.	1400	388	35	54	1970	540	76
45.	48.8	46.8	4.44	68.9	31.1	2 hr. 15 min.	1280	310	25	40	1860	455	58
50.	46.4	49.5	4.24	66.7	33.2	2 hr. 45 min.	1342	310	30	42	2010	460	63

TABLE III.
DATA ON LITHOPHONE.

Vol. lith. to 100 vol. Rubber	(per ct. by weight) Rubber	Litho-phone	Sulfur	(Neglecting S per ct. by volume) Rubber	Litho-phone	Best cure at 40 No. steam	Tensile strength lbs. sq. in.	Elong-ation	Perma-nent set per ct.	Tensile product	Values corrected back to (100 volumes of rubber.) Tensile strength lbs. sq. in.	Elong-ation per ct.	Tensile product
.0	91.	.0	9.	100.		2 hr. 15 min.	2660	940	6	250	2660	940	250
2.	83.9	7.58	8.39	98.1	1.9	2 hr. 30 min.	2645	860	8	228	2700	875	232
6.	72.9	19.83	7.29	94.4	5.6	2 hr. 40 min.	2450	840	8	206	2590	891	219
11.	62.5	31.1	6.25	90.1	9.9	2 hr. 30 min.	2340	820	10	192	2590	908	213
15.	56.1	38.1	5.61	87.	13.	2 hr. 40 min.	1910	790	16	151	2200	910	174
20.	49.9	45.1	4.99	83.4	16.6	2 hr. 30 min.	1970	810	16	160	2370	973	192
25.	44.7	50.9	4.47	80.	20.	2 hr. 30 min.	2020	740	16	150	2520	927	188
30.	40.6	55.4	4.06	76.9	23.1	2 hr. 30 min.	1960	690	20	135	2550	898	176
35.	37.3	59.	3.73	74.1	25.9	2 hr. 30 min.	1595	630	26	101	2150	848	136
40.	34.5	62.1	3.45	71.4	28.6	2 hr. 30 min.	1525	600	16	92	2140	841	129
45.	31.9	65.	3.19	68.9	31.1	2 hr. 20 min.	1355	545	22	74	1970	794	108
50.	29.7	67.4	2.97	66.7	33.2	2 hr. 40 min.	1495	570	18	85	2340	855	128

Zinc Oxide—This produces a somewhat greater drop in elongation, at the beginning of the curve.

Tensile Product, Fig. 3

Magnesium Carbonate—Shows the highest values but rapidly falls off when over 15 volumes are employed.

Gas Black—Holds practically constant until 20 volumes and then falls away.

Lithophone and Barytes—Both are quite low.

Tripoli—Comes up and then rapidly goes down, indicative that both tensile and elongation are markedly affected by increase in filler.

Zinc Oxide—Shows a rather steady falling off.

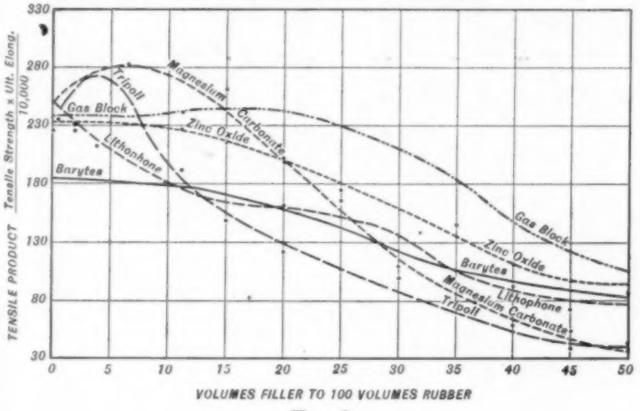


FIG. 3

The above curves are satisfactory only as far as they go. The methods employed do not permit one to analyze the effects of the filler and to differentiate between simple decrease in tensile with decrease in rubber and increase in tensile due to some peculiar property or action of the filler. By using the corrected values we eliminate the effect of decreasing the actual rubber content of the stock.

Corrected Values, Tensile Strength, Fig. 4

Barytes—It is remarkable how well the evidence supports the view that this filler has no effect on the stock. The straight line curve is not absolutely accurate considering the data but it is believed to be very closely to the truth.

Lithopone—Falls off to about 2400 lbs. per sq. in. and then very gradually declines.

Tripoli—Shows the same behavior as in other curves which would indicate some peculiar behavior of the filler, probably a cutting action by the siliceous skeletons of the diatoms.

Zinc Oxide—Comes up to a maximum at 15 vol. and remains constant until 35 vol. is reached. At this point we have a decided falling off in corrected tensile. This value can be taken as the maximum quantity which may be added without overloading.

Magnesium Carbonate—Shows a maximum value from 6 to 15 vol. beyond which it shows a marked decline.

Gas Black—Shows a continued increase until 30 vol. is reached. Beyond this point the curve remains constant. Apparently black has a stiffening or toughening action on rubber.

Ultimate Elongation, Fig. 5

Barytes and Lithophone—Have very little effect on the elongation. The values obtained are not far from those secured with pure gum.

Tripoli, Gas Black and Magnesium Carbonate—Show about the same effect, i.e., a gradual decrease with increased filler.

Zinc Oxide—Gives a more or less flat curve which does not show such a marked decline as the others.

Tensile Product (Corrected), Fig. 6

These curves require considerable study. The previous conclusions are substantiated.

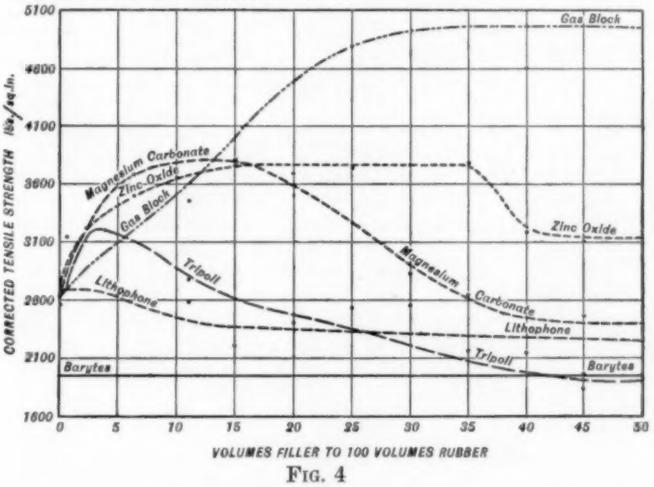


FIG. 4

Magnesium Carbonate—Is shown to give excellent results up to 15 volumes.

Gas Black—Increases the corrected tensile product up to 20 vol. after which the curve declines thus indicating that the increase in tensile as ordinarily figured, is more or less at the expense of elongation.

TABLE IV.
DATA ON MAGNESIUM CARBONATE.

Ratio vol. $MgCO_3$ to 100 vol. Rubber	(per ct. by weight) Rubber	$MgCO_3$	Sulfur	(1 per ct. by vol.) Rubber	$MgCO_3$	Best cure at 40 No. steam	Tensile strength lbs. sq. in.	Elong-ation per ct.	Perma-nent set per ct	Tensile product	Values corrected back (to 100 volumes of rubber.) Tensile strength lbs. sq. in (per)	Elong-ation per ct.	Tensile product
.0	91.	.0	.9	100.	.0	2 hr. 15 min.	2660	940	6	250	2660	940	250
2.	87.5	3.76	8.75	98.1	1.9	1 hr. 50 min.	3120	850	8	266	3180	866	271
6.	81.4	10.5	8.14	94.4	5.6	1 hr. 40 min.	3480	810	16	282	3690	860	299
11.	74.85	17.69	7.48	90.1	9.9	1 hr. 40 min.	3480	770	32	242	3480	855	269
15.	70.3	22.7	7.03	87.	13.	1 hr. 50 min.	3320	790	44	262	3820	908	302
20.	65.4	28.	6.54	83.4	16.6	1 hr. 40 min.	2920	685	52	200	3500	822	241
25.	61.1	32.8	6.11	80.	20.	1 hr. 20 min.	2670	630	44	168	3340	788	210
30.	57.4	37.	5.74	76.9	23.1	1 hr. 20 min.	2170	505	48	110	2830	658	144
35.	54.	40.6	5.4	74.1	25.9	1 hr. 20 min.	1950	455	42	87	2630	600	117
40.	51.1	43.8	5.11	71.4	28.6	1 hr. 20 min.	1670	350	32	58	2340	490	81
45.	48.8	46.8	4.83	68.9	31.1	1 hr. 20 min.	1695	305	44	52	2470	440	76
50.	45.9	49.5	4.59	66.7	82.2	1 hr. 20 min.	1695	210	48	36	2540	315	54

TABLE V.
DATA ON ZINC OXIDE

Ratio vols. ZnO to 100 vols. Rubber	(per ct. by weight) Rubber	ZnO	Sulfur	Thiocarbanilide	(per ct by vol.) Rubber	ZnO	Best cure at 40 No. steam	Tensile strength lbs. sq. in.	Elongation per ct.	Permanent set per ct.	Tensile product	Values corrected back to (100 volumes of rubber) Tensile strength lbs. sq. in.	Elongation per ct.	Tensile product
.0	90.		10.		100.	.0	2 hr. 15 min.	2560	890	4	228	2560	890	228
.5	86.3	2.55	7.76	3.33	99.5	.5	45 min.	3120	750	5	234	3140	755	235
2.	80.21	9.46	7.2	3.08	98.1	1.9	40 min.	3140	735	8	231	3200	750	235
4.	73.3	17.3	6.58	2.82	96.25	3.75	40 min.	3060	690	7	211	3180	718	220
6.	67.42	23.86	6.06	2.6	94.4	5.6	50 min.	3290	705	10	232	3490	746	246
11.	56.21	36.54	5.05	2.16	90.1	9.9	35 min.	3295	690	16	228	3660	765	252
15.	49.65	43.92	4.46	1.91	87.	13.	35 min.	3295	656	17	216	3790	755	249
20.	43.32	51.04	3.88	1.68	83.4	16.6	35 min.	3070	655	22	201	3690	786	241
25.	38.39	56.7	3.45	1.48	80.	20.	35 min.	3000	585	24	176	3750	732	220
30.	34.5	61.1	3.1	1.29	76.9	23.1	35 min.	2900	550	26	159	3770	715	207
35.	31.31	64.61	2.82	1.21	74.1	25.9	35 min.	2795	510	29	143	3770	687	193
40.	28.7	67.7	2.58	1.10	71.4	28.6	35 min.	2285	485	27	111	3210	680	156
45.	26.45	70.2	2.38	1.02	68.9	31.1	50 min.	2140	455	32	97	3110	660	142
50.	24.48	72.28	2.19	.94	66.7	33.2	35 min.	2105	450	30	95	3160	675	142

Zinc Oxide—Comes to a maximum at 11 vol. to 100 vol. of rubber.

Lithophone, Barytes and Tripoli—Function as before.

Permanent Set Fig. 7

On Fig. No. 7 data as to the relative permanent sets of the respective stocks is plotted. The method of obtaining permanent set was worked out by E. L. Davies and the writer and

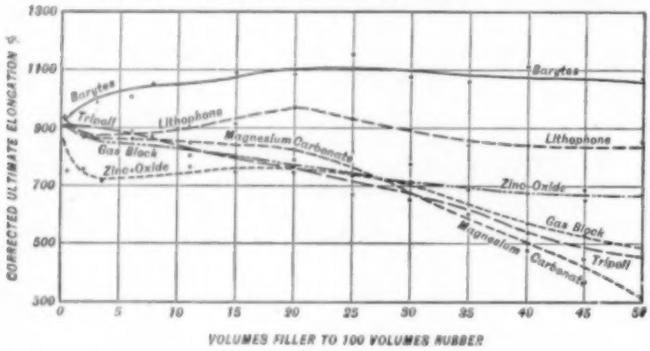


FIG. 5

was described by my colleague in a letter accompanying the methods proposed by the Rubber Testing Committee.

The curves all show a decided increase in set, i.e., plasticity, with increased filler. The very high set obtained with 20 vol. magnesium carbonate explains why American compounders have not used this filler to any marked extent.

Network Structure of Rubber

It is desirable for the better understanding of compounding phenomena to form a mental picture of the probable internal structure of rubber. The conception presented is given solely as a vehicle for thought.

As a working hypothesis let us assume that vulcanized rubber consists of plastic material and elastic fibers. There is evidence that some such condition actually exists. For instance, elastic fibers are indicated by the following:—

(1) It is well known that high grade stocks have a noticeable grain when calendered, i.e., the tear in the direction the stock has been run. This is as true for pure gum as for compounded stocks. Grain in rubber is somewhat analogous to grain in wood. See Table VII.

(2) Calendered stocks have higher tensile strength and lower ultimate elongation with the grain than across it.

(3) Previous stretching (see Bull. 38 Bureau of Standards) increased tensile strength. See Tables VIII and IX.

That plastic material is present is indicated by:—

(1) Test pieces in which a set has been developed tend to recover their original length. Set decreases with time after release. Pure gum recovers in 8 hours 75% of the original set (measured after 10 minutes). See Table X.

(2) Schwartz (Schidrowitz Rubber P. 241) pointed out that elongation under constant load follows the equation:—

$$x = a + b \log t$$

when x = elongation at the end of an interval of time t
a = elongation at the end of the first min.
b = a constant depending on the plastic flow of the stock.

Extension, Fig. 8

Fig. No. 8 shows $(x—a)$ plotted against $\log t^1$ for a heavily loaded black stock under 25 lbs. load. The curve is a straight line which shows that the equation actually holds.

This indicates that rubber consists in part of a plastic substance which may be regarded as a super cooled liquid which probably forms a matrix for the elastic fibers.

(3) That the set is due to plastic material is indicated by

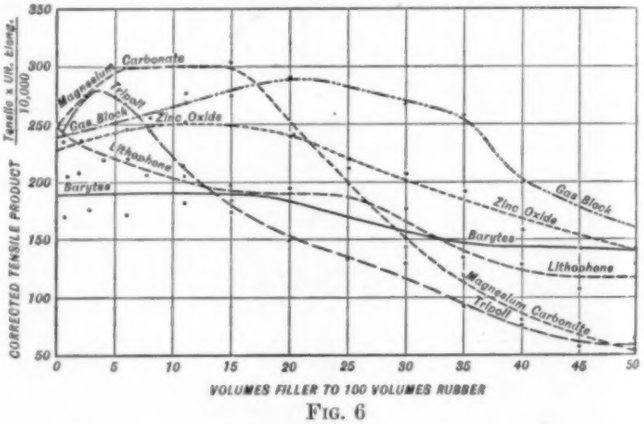


FIG. 6

the fact that it is decidedly increased when a material known to be plastic, as for example mineral rubber, is added.

Returning to the hypothesis that rubber consists of plastic material and elastic fibers, it is recognized that the colloidal aggregates $(C_{10}H_{16})_x$, doubtless vary considerably in size. The chief difference between plastic and elastic matter would appear to be in the size of the aggregate.

TABLE VI.
DATA ON GAS BLACK

Ratio volumes of black to 100 vol. Rubber	(per ct. by weight) Rubber	Black	Sulfur	(per ct. by vol.) Rubber	Black	Best cure at 40 No. steam	Tensile strength lbs. sq. in.	Elongation per ct.	Tensile product T x E 10,000	Permanent set per ct.	Values corrected to 100 vol. rubber Tensile strength lbs./sq. in.	Elongation per ct.	Tensile product
.0	90.		10			2 hr. 30 min.	2600	900	2340	6	2600	900	234
.5	90.2	.83	9.	99.5	.5	2 hr. 45 min.	2720	920	2500	10	2740	925	251
2.	88.	3.23	8.8	98.1	1.9	2 hr. 45 min.	2880	840	2420	13.5	2930	855	247
4.	84.8	6.2	8.5	96.2	3.8	3 hr. 00 min.	2900	820	2388	14	3020	853	247
6.	82.5	9.13	8.25	94.4	5.6	2 hr. 45 min.	2940	790	2320	15	3120	838	246
8.	80.2	11.8	8.	92.6	7.4	3 hr. 00 min.	3040	780	2370	17	3280	843	256
11.	76.8	15.6	7.68	90.1	9.9	3 hr. 00 min.	3260	760	2480	22.5	3620	843	275
15.	72.5	20.2	7.25	87.	13.	3 hr. 00 min.	3420	700	2390	27	3940	805	275
20.	68.2	24.8	6.8	83.4	16.6	2 hr. 45 min.	3770	640	2410	32.4	4530	770	279
30.	60.5	33.5	6.0	76.9	23.1	2 hr. 45 min.	3800	545	2070	40	4940	710	269
35.	57.3	36.9	5.7	74.1	25.9	2 hr. 45 min.	3700	510	1890	43	4980	688	255
40.	54.4	40.2	5.4	71.4	28.6	2 hr. 30 min.	3480	410	1430	40	4880	575	200
45.	51.8	43.	5.18	68.9	31.1	2 hr. 30 min.	3420	365	1250	46	4980	530	182
50.	49.4	45.6	4.9	66.7	33.2	2 hr. 45 min.	3300	320	1055	48	4950	494	158

Vulcanization produces a profound change in the properties of rubber. In the uncured condition it is weak and plastic. Properly vulcanized, it is strong, elastic and resistant to repeated flexing. The polymerizing influence of sulphur is well known in organic chemistry.

TABLE VII.
VARIATION OF TENSILE STRENGTH AND ULTIMATE ELONGATION WITH DIRECTION OF GRAIN.

Stock	No. 1	No. 2	No. 3
Tensile Strength			
Longitudinal..	2730 No./sq.in.	925 No./sq.in.	10,550 No./sq.in.
Transverse....	2675 No./sq.in	625 No./sq.in.	3,160 No./sq.in.
Elongation Ult.			
Longitudinal..	630 per. ct.	90 per ct.	———
Transverse....	640 per ct.	210 per ct.	———
	Cheap tread	Cheap Mechanical	Asbestos Packing

Is it not possible that the chief effect of vulcanization is the locking up or polymerization of these colloidal aggregates? Plastic material probably also unites with sulphur but since it is composed of much smaller aggregates the effect is not so marked. If this is the case we may regard vulcanized rubber as consisting essentially of a vast network of very fine fibers linked up and strengthened in some way by sulphur. This network extends throughout the plastic materials present and also completely surrounds and incloses any filling material that may be present in the stock. It is to this network that the writer attributes the desirable properties of rubber such as its strength, its elasticity, its resistance to repeated flexing and its ability to be compounded.

TABLE VIII.

Stock	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
Tensile strength No./sq.in.						
Single Stretch.....	2470	1740	990	1710	750	930
Repeated stretch....	2610	1960	1180	1790	790	920
Ultimate Elongation per ct.						
Single stretch.....	645	665	510	460	430	375
Repeated stretch....	765	780	645	555	440	465

(Bureau Stds. Bull. 38, P. 41, Table 6)

Carrying this picture farther let us consider an ordinary fishing net. Empty, it can be stretched out to a rather great length. But when it is full of fish it is no longer possible to alter the shape to anything like the previous extent. The fish act as struts and keep the sides of the net distended. If you will imagine many nets closely interwoven and imbedded in

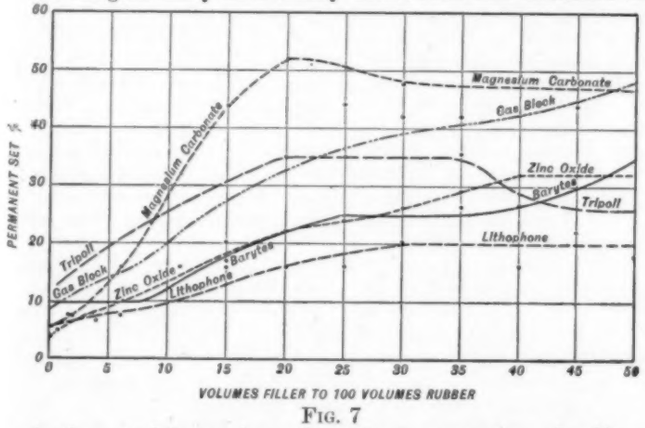


FIG. 7

plastic material, you have the writer's conception of rubber. When compounding material is introduced the net is distended and there is a strut action which prevents ready change of position.

Examples of similar conditions are found in reinforced concrete and in the mordanting or weighing of fabric. In the second case we have merely interposed particles among the fibers of the cloth in such a way that they are no longer free to move. In other words we have wedged them into position.

Applying the same idea to a compounded stock it would appear that the increase in tensile strength of a stock produced by compounding ingredients is due to two principal effects:

The first, that the filling material so distends the network reinforcement of rubber that the stock becomes stiffer, less

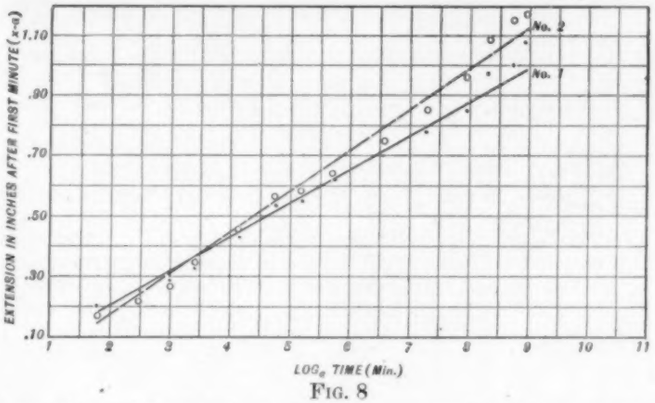


FIG. 8

stretchy and its tensile strength as measured on the area at rest is increased because a greater area is presented at break.

The second, and more important effect is due to the influence of the compounding ingredient on the closeness of weave of this net. Rubber doubtless contains colloidal aggregates of different lengths. When a coarse compounding ingredient is added, only the long fibers become effective in constructing the network around the particles. Consequently the resulting stock has a loose weave. It tears readily, the ultimate elongation is not greatly influenced and the tensile strength of the rubber has not been increased.

TABLE IX.
EFFECT OF REPEATED STRETCHING AND SUSPENSION UNDER LOAD ON TENSILE STRENGTH AND ULTIMATE ELONGATION.

Stock: Compounded rather heavily; chiefly with gas black.	
Tensile strength No./sq.in.	
Single stretch	2960
Stretched twice to 75 per ct. breaking elongation	3200
Suspended 135 hrs. under 25 lbs. load	3950
Ultimate Elongation per ct.	
Single stretch	585
Stretched twice to 75 per ct. breaking elongation	675
Suspended 135 hrs. under 25 lbs. load	475

When the compounding material is very finely divided, the short colloidal aggregates also become effective in looping up the particles of filler. The more finely divided the ingredient the more fibers that are rendered effective. In this case the network reinforcement is closely woven and contains the maximum number of loops, each of which is more or less wedged and anchored in place by the particle it incloses. The resulting stock is close grained. It does not tear easily and has a high tensile strength. Gas black is the best example of this type. It has perhaps the finest state of division of all compounding ingredients known to date and its effect on rubber is more marked than that of any other filler. Its tensile strength and tensile product values, when corrected back to the actual volume of rubber present, are exceptionally high. It produces, when properly handled, a closer grain than can be obtained with any other material. Zinc oxide is a close second to black in point of fineness and from a compounding standpoint its position is admittedly the same.

TABLE X.
DECREASE OF SET WITH TIME.

Time after release	A per ct.	B per ct.	C per ct.	D per ct.	E per ct.	F per ct.	G per ct.
10 minutes	8	19	10	26	24	34	37
20 minutes	6	18	8	26	22	31	34
40 minutes	4	17	8	24	20	30	33
1 hour	4	17	8	24	20	30	33
2 hours	4	16	6	24	20	29	33
4 hours	2	16	6	23	20	28	32
6 hours	2	15	6	22	19	27	30
8 hours	2	15	6	22	18	27	30
Recovery	—	—	—	—	—	—	—
in 8 hours	6	4	4	4	6	7	7
Recovery based on set in 10 minutes	75	21	40	15.4	25	20.6	19

Method—Stretched to 75 per ct. the breaking stretch (ult. Elong.) held 10 minutes. Released and measured at intervals after release.

Stocks
A — pure gum.
B — cheap friction.
C — friction.
D — low specific gravity tread.
E — high specific gravity tread.
F — cheap tread.
G — mechanical.

The Durability of Airship Fabric

Fabrics for lighter-than-air craft usually consist of cotton cloth coated with rubber. The requirements are high strength, light weight, low diffusion, water resistance and durability. The most important of all is durability and extended observations show that the intensity and time of exposure to sunlight varies the life of rubberized fabric to a great extent. Dirigibles operating off the Florida peninsula and using envelopes made with a fabric that a year ago was considered to be of standard quality, have had a useful period of not over thirty days. At the end of that time replacement of gas is necessary which reduces the operating period. Envelopes made of the same fabric and operated off waters adjacent to Long Island have shown an average useful life of fifty days before deflation was necessary.

The Manufacturers Aircraft Association has learned that a study of British and other foreign practice in fabric manufacture, combined with the results of extended exposure tests carried out under various climatic conditions with fabric made experimentally in this country has led to the formulation and adoption of what is believed to be improved rubberized fabric.

Airship Fabrics

The cloths that are used to the greatest extent are known as AA, BB and DD. The specifications of these cloths are as follows:

CLOTH AA (2 oz):

Raw cotton—Long-staple sea-island, Egyptian, or Arizzona-Egyptian cotton.

Width—40.5 inches, finished; tolerance of 3/8 inch.

Weight—2.1 ounces, maximum per square yard, finished.

Tensile Strength—30 pounds minimum for either the warp or filling finished.

Count—118 threads minimum per inch either way, finished.

CLOTH BB (2.5) oz:

Raw cotton—Long-staple sea-island, Egyptian, or Arizona-Egyptian cotton.

Width—40.5 inches, finished; tolerance of 3/8 inch.

Weight—2.65 ounces maximum per square yard, finished.

Tensile strength—45 pounds minimum for either warp or filling, finished.

Count—128 threads minimum per inch either way, finished.

CLOTH DD (4.5) oz:

Raw cotton—Long staple sea-island, Egyptian or Arizona-Egyptian cotton.

Width—40.5 inches, finished; tolerance of 3/8 inch.

Weight—4.6 ounces maximum per square yard, finished.

Tensile strength—65 pounds minimum for either warp or filling, finished.

Count—95 threads minimum per inch in the warp and 105 threads minimum per inch in the filling, finished.

After manufacture an extremely careful inspection is made of the cloth, both before and after such treatments as desizing and washing. All slubs and imperfect spots are marked so that they may be cut out before rubberizing. In the rubber factories the cloth is first passed through spreading machines where thin coats of dough are applied. Dough is rubber cut with absorbed naptha and similar volatiles. Most carefully selected pure up river Para gum is used for this purpose. and there is added only a very minor percentage of sulphur and litharge without the usual organic cure accelerators previously used. This thin rubber solution fills up the interstices of the weave. Much heavier rubber dough is then applied on the spreading machines as the process proceeds.

After twenty to twenty-five coats are spread and dried, a continuous, gas tight film is produced. The gas-tightness depends, however, upon such factors as the thickness of the rubber proofing and the count of the cloth; high count cloth and heavy proofing giving the minimum diffusion. For instance, with a 2 ply BB cloth having a gas film of from 3½ to 4 oz., there is obtained a very low diffusion. Added weights of proofing applied to higher count cloth would probably induce but slightly better results than are obtained with the above construction. Two plies of the treated cloth are stuck together by means of roll ply machines. The fabric is then wound on drums, wrapped and steam cured at carefully controlled temperatures and pressures for periods of time that have been found most satisfactory. Over-vulcanization results in a fabric that ages rapidly, becoming brittle and stiff upon exposure. Colored proofing is then added which it is believed constitutes an important factor in reducing the action of light, such as is described in the beginning of this article. The exterior of the fabric is faced with an aluminum coat which acts as a continuous light reflecting coat.

The inner or gas side of the fabric is coated with from one-half to one ounce of pure rubber which helps to keep the cloth moisture-proof, reduces diffusion and makes a good sticking coat for successful taping. The tape is applied both to the exterior and interior.

Dirigibles of an early type which do not have the aluminum surface but which contain secret cure accelerators in the rubber proofing, after having failed in service have been treated with dope so that high diffusion might be reduced. Envelopes that required as high as 1500 cu. ft. of hydrogen per day have, since doping, been used continuously for several weeks and show but slight diffusion.

The Manufacturers Aircraft Association is informed that this improvement in rubberized fabric will increase the production of lighter-than-air craft; which in turn means that commercial, freight and passenger dirigible lines over the United States will be more quickly realized.

Rubber Selection *

By H. W. Jack

The scientific study of the variations of the *Hevea* rubber tree has greatly developed during the last few years and investigators have proved beyond all doubt that *Hevea* presents a wide field for selection work in this country and the ultimate improvement of the rubber industry. Different workers have shown that the individual yields of rubber trees vary from practically nothing up to at least 30 pounds of dry rubber per annum and that 65 per cent of the crop is derived from 20 per cent of the trees on an estate. Thus, every rubber plantation consists of many poor and a few good yielders which contribute the main bulk of the crop. Moreover, it has been found that good trees remain good and poor trees continue to be poor yielders.

It is readily admitted that selective thinning out increases the yield of rubber, improves the bark renewal and reduces the cost of production but the selective thinning must be based on the production of individual trees. In the light of these recent developments, it is the intention of the Agricultural Department to initiate enquiries on the older estates with a view to locating the best trees and using them as stock for the foundation of rubber-breeding work. The success of work of this nature depends very largely on the scope of the original choice of parent stock and (over such an extensive area as the estates of this country present), wide selection of parent trees is only possible if the planters co-operate by assisting in the search for heavy yielding healthy trees. Selection work with a perennial crop, like rubber, is unavoidably slow, but as a necessary preliminary the planters are earnestly requested to watch out for especially high yielding trees and to report their existence to the Economic Botanist who will endeavor to arrange an inspection of the trees, and a measurement of the yield.

Thus, with the assistance of the planters, records of individual yields of good healthy trees can be obtained and these records will form the basis of selection work with the most important crop in the country. The planters are requested to report only trees of over nine years of age which give a daily yield of more than half the depth of a cup of latex (roughly 75 ccs., or 3 ozs.).

*Agricultural Bulletin of the Federated Malay States.

The Rubber Industry in Sumatra and Malaya

By C. D. Rockwood

Purchasing Agent, Mason Tire and Rubber Co., Kent, Ohio

(Continued from issue of July 25, 1920)

We now come to the living conditions in Sumatra and Malaya. Supplies other than rice are dispensed by outside vendors or coolies who are no longer employed as tappers, from an open market place, which in all cases is furnished by the company for market purposes only. On some of the real small estates, 1,000 to 1,500 acres, no special building is erected for this purpose, but on the larger ones it is necessary.

Plenty of fresh water must be available for bathing and drinking. The governments of both Sumatra and the F. M. S. now require the planting of approximately 3½ acres, per month to each 100 coolies, to foodstuffs on account of the great rice scarcity. In Sumatra a great amount of maize or field corn is now being grown successfully and in a measure relieves the rice shortage.

Clearing the Land

The smaller trees, undergrowth and vines must first be cut, following which the larger trees are felled and the suitable timber cut up on the estate by Chinese sawyers, for use in construction, and where large quantities of lumber are available it is sold to other estates. The land is then burned over in order to take advantage of the additional fertilizing qualities which come from wood ashes.

The Goodyear Company is successfully pulling the smaller stumps and roots by means of a 75 hp. Holt caterpillar tractor. The larger stumps are usually burned out as blasting is not satisfactory in most cases on account of the loose soil, which when explosives are used, simply loosens up and does not remove the stump.

It is absolutely essential that all wood be removed from the soil to a depth of at least twelve inches, as decaying logs, roots, etc., aid the spread of root disease, or Fomes, which is a fungus, and in many cases where the wood has not been properly removed on account of running the work too fast, thousands of trees have been ruined.

Many estates allow the largest stumps to remain for the first eighteen months to two years, during which time they rot considerably and their removal is made much easier. This practice is dangerous, however, and the land should be thoroughly cleared, chunkled and cleaned to a depth of at least 12 inches as above stated. The soil around and in all stump holes should be treated with lime, to kill Fomes and other bacterial growths. This method will lessen materially losses from disease and consequently make for greater production per acre.

Cost of Work

The work of clearing can be contracted at a flat figure, there being many Chinese Toukes and half casts, who make this work their business, and will even clear, chunkling land, plant and bring into bearing any desired area.

The cost of bringing an estate into bearing, from the virgin jungle, now runs on the average $400.00 U. S. per acre. This figure varies in different localities but is a safe average in every way at this time. Clearing of the jungle alone which includes removal of all timber and all stumps up to 6 inches in diameter but no clunkling of the land, can be done at a cost of about $40.00 U. S. per acre. This would be on a contract basis, on which the contractor would furnish to the estate all the timber and boards needed for construction, but the balance of the timber would be his to sell on the outside.

Commercially the Heves Braziliensis is the only type of rubber tree which has been successful in this section and is the only one grown to any extent.

The Ficus Elastica, while having a latex of high commercial value, has not been successful on account of the very low yield of latex and the difficulty of tapping. The growth of this tree is very fast, but the trunk of the tree does not furnish enough smooth surface to tap like the Heves, owing to the fact that the lower branches grow down to the ground and take root and in very old trees none of these branches reach a very large diameter.

There are three recognized ways of planting an estate, i. e., sowing germinated seeds, setting out plants, setting out stumps.

The seeds are selected from the healthiest and best producing of the older trees. It is possible and quite easy to identify the seeds as to the parent tree, as the seeds from every tree are different, in size, color, shape, marking, etc., and the seeds from any given tree will always be exactly alike.

When planting seeds, it is customary to germinate them in a specially prepared bed of loose sand about six inches deep and to cover them with wet gunny sacks, which should be sprinkled twice a day. If it is impossible to make the bed in a shady place it is advisable to erect a shade of thatch over it.

Germination takes place between the eighth and fifteenth day and any seeds which have not germinated by the eighteenth day should be thrown away, as in all probability they are sterile. The fertility of a rubber seed is very short lived, 7 to 30 days according to various authorities, and they should be planted very soon after they come off the parent tree.

Setting Out Germinated Seeds

Setting out of the germinated seeds is done immediately after germination is complete.

Where the estate is started from plants, the plants 2 to 6 months old and 18 inches to 3 feet high are set out in a permanent location.

Trees which have been grown in the nursery till they are one year old, are cut off about three feet from the ground and the tap root is cut off to about 18 inches, and then they are set out in permanent locations to take root and put out new branches. Such trees are called stumps.

This method of planting permits the planter to save at least 8 months in bringing the plantation into bearing, as the seeds can be set out in the nursery and growing while the jungle is being cleared, and at the end of the first year, the ground will have been cleared and ready for planting, so that when the stumps are set out practically a year has been saved in their growth.

Seeds, plants and stumps can be purchased from the larger plantations very cheaply. The plants 2 to 6 months old and 18 inches to 3 feet high cost 2c each U. S. and obtaining stock for a new plantation is very inexpensive. After an estate has been started they all maintain their own nurseries.

The proper distance apart for planting the trees, or the number to the acre has been much discussed and it is different in practically every plantation, but the most common practice now seems to be 15 ft. x 30 ft. Plantation 96 trees to the acre, 12 ft. x 24 ft. Plantation 150 trees to the acre, 22 ft. x 38 ft. and one in the center.

There are many theories on this subject but the above figures are considered good practice, and from personal observation we have noted that trees planted very close together, say 10 ft. x 10 ft. or 8 ft. x 8 ft. usually have very small boles and are backward in production likewise, which argues for wider planting to allow sufficient room for the lateral roots to spread and the sun to get at the earth, thus purifying the soil and producing healthier, larger trees.

Weeding

Proper and continuous weeding is essential, as owing to the climate the weeds grow very fast and it is much cheaper to keep them clear by continuous weeding than to do it two or three times a year. Furthermore, if the weeds are allowed to run many undesirable plants will come in and get a start, such as Lalang, a tall hard grass with very long roots, which are expensive to dig out. Accessibility to the trees and the fact that the weeds deprive the soil of much needed nourishment are other reasons for continuous weeding.

From "The Mason Mail"

The common method of weeding as now used is by hand. A gang of female weeders sufficient to cover the estate twice a month is maintained and they go over the plantation continuously with hoes digging out every weed which appears.

A new method has recently been introduced by a large Danish estate ten miles from Johore Bharu, which is meeting with great success and has reduced the cost of weeding materially on that estate. Very light plows drawn by oxen are used and the soil is turned up to the depth of about four inches. In addition to killing the weeds, this method cultivates the soil and is very useful in warding off Fomes and other bacterial growths in the soil. It also increases the yield of latex.

The Pontian and Soehak estates of the Indo-Malay Co., forty miles north of Johoro Bharu, have adopted this method and are highly pleased with the results obtained. Mr. Ramsey manager of the Pontian Estate, is of the opinion that while using oxen on the plows is now cheaper than using tractors, that the constantly increasing costs of labor and oxen will make the tractor method cheaper and better in the long run.

Experiments have been conducted by the F. M. S. Agricultural Station, using a Ford tractor and plows for weeding and it was found that the cost of this method was $2.82 U. S. per acre as compared with $2.40 U. S. by oxen and plows.

Tapping

The best tapping method is another much discussed and apparently little known object, although a system adopted from the "Fitting System" is now in almost general use on European estates. It consists of a half-herringbone cut on 1/3 of the bark surface of the tree, the first tapping being 20 inches from the ground. This method conserves bark surface and side bark removal and as practiced, allows each tapping surface six years for bark renewal. The first year approximately twelve inches of bark is removed on one-third the surface of the tree, twenty inches from the ground, the second year, tapping is moved over to the next one-third surface at the same distance from the ground and the third year this is repeated on the last one-third surface. The fourth year, tapping is started about 36 inches from the ground, on the one-third surface directly over the first year's tapping and this process is continued to the sixth year when the bark on the surface tapped the first year is again ready for tapping. One inch of bark is removed each month in tapping.

On many of the Chinese estates the old "V" or herringbone system is still in vogue and in most cases the bark renewal is very poor.

Many of the European estates are tapping on the half-herringbone system but using only one-fourth of the bark surface and starting tapping 26 inches from the ground, circling the tree once in four years. This system is considered very good also.

The proper age for tapping is 4½ years and the most common method of determining the time for tapping is to start when 60 per cent of the trees reach 18 inches in circumference three feet from the ground.

One coolie usually taps 400 to 450 trees in the early morning and collects his latex and turns it into the factory by noon. He may use either the afternoon or the time when he is tapping for collecting scrap and earth rubber.

Collection of Latex

The latex runs down a groove in the bark to a metal spout, which is driven into the tree, and collected in a latex cup. These cups are 4 or 5 inches in diameter at the top and hold about half a pint of latex. The coolie collects the latex in pails or ordinary milk cans, and on the smaller estates, carries it to the factory.

On the larger estates there are central receiving depots where the latex is turned in and it is then taken to the factory by bullock cart, motor truck or train.

The factory is centrally located and varies in size and equipment according to whether they are making crepe or smoked sheets.

The handling of the latex is much the same on every estate. It is weighed in at the factory and each tapper given credit for so much "milk" from his tank or division. The bark from his tappings which he collects when he is tapping, is also weighed and credited to that division, together with the coagulated scrap from the previous day's tapping.

The first run latex is then put through a strainer, to remove the lump rubber, into a tank, usually porcelain lined, for coagulation. The process of coagulation is practically the same in all cases.

Acetic acid in the proportion of one part to 1100 parts of standard latex is the common formula for coagulation. Standard latex must test 1½ lbs. dry latex to the gallon and is tested with a lexometer to determine the viscosity. If too thick, it can be thinned down by water and if too thin, thicker latex can be added to bring it up to standard.

Factory Processes

From the first run latex is made all Singapore standard sheets (prime sheets) and pale crepe. During the process of manufacturing, some of the sheets may get a little dirty or over cured in the smoke house and when the process is complete, the rubber is sorted and graded.

The clean thin brown crepe is made from lump rubber, i. e., latex which coagulated naturally in the bottom of the cup in the field, and cup wash. Many think that the clean thin brown is better than the pale crepe, as it is largely naturally coagulated rubber and is clean.

The dark brown crepe is made from the tree scrap and the bark removed in tapping, and what is called on the estates, earth rubber is made from the latex which runs down the tree to the ground after the cup has been removed for the day. This rubber is quite dirty and is suitable mainly for mechanical goods, etc.

All of the above classifications are sub-divided except the earth rubber, according to color and grade, but these additional classifications are brought about by the buyer's peculiarities.

The manufacture of crepe is more expensive than the making of smoked sheets, as the latter are put through at least four and even more mills and are finished on smooth rolls. This additional machining is also more or less detrimental to the rubber as it breaks down the fibre more than the smoked sheet process.

When thoroughly washed and sheeted, the crepe is hung in darkened rooms on racks to dry. This takes a matter of ten days to two weeks, before it is ready for packing and shipment to the market.

The smoked sheets are not machined as in the case of the crepe. The latex for sheets is coagulated in slabs about 1½ inch thick x 15 inches wide and 48 inches long and put through a pair of smooth light rolls which presses out a large quantity of moisture and reduces the thickness to about ⅝ inch, after which it is put through a pair of marking rolls. These rolls brand the sheet and put the little squares or diamonds on, which appear in the finished sheet. They also reduce the thickness of the sheet to the desired finished thickness.

The sheets are then hung on racks ready for the smoke shed, which is a rough board house with plenty of ventilation at the top. The floors are made of slats to permit the free circulation of the smoke which comes from fires of wood or cocoanut shells, underneath the house. The smoking is done at night and the house allowed to cool during the day.

The smoking process takes ten days to two weeks, after which the sheets are ready for sorting and packing. The smoking of sheets is run as a continuous process, as each day some of the sheets are ready to come out and that day a run of sheets is put in in the place of those which are taken out and properly labeled for identification.

Market Prices

It is interesting to note that while the cost of making smoked sheets is much lower than for crepe, the sheets bring higher prices on the market. It might also be of interest to note that the large rubber companies are not making smoked sheets on their estates and are making but very little crepe, the bulk of their product going into slab rubber.

This form of rubber is not machined at all except to press out a small amount of the moisture and it is laid on racks to dry. It is naturally coagulated also, no acetic acid being used.

In the process of drying the outer portion of the rubber dries making a sort of crust, whereas the inside of the slab is still moist and retains all of the original properties of the latex as it comes from the trees, and is a very desirable grade of rubber. The moisture content, however, varies to such an extent, 10 to 30 per cent, that unless produced from one source over which the buyer has control, the product will likely be far from uniform.

Illumination an Aid to Production

The test of a successful illuminant in industry is the degree to which it is responsible for increased production and to which it adds to the comfort, and makes conditions safer for the workers. In the rubber industry not only the character of some of the machinery used, but the color of the material itself creates special conditions that make adequate lighting somewhat of a problem.

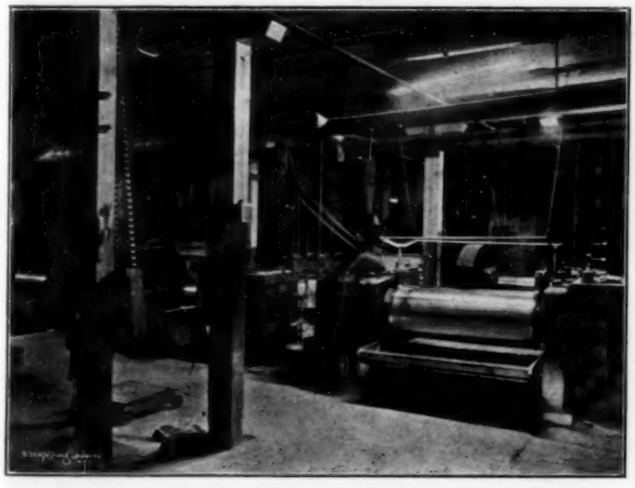
The predominating colors—black, or dark grey, both absorb a high percentage of any light and unless the light has good perceptive qualities, and is well diffused, considerable eye strain may easily result.

The Cooper Hewitt mercury vapor lamp has been applied to the lighting of rubber factories where various rubber products are made with results that have proved its great value for this particular class of work. These results can mostly be traced directly to the characteristics of the light, both color, and diffusion.

Illumination Increases Safety

For instance, the hood used over mills, to draw off the fumes of the rubber passing through the rolls makes the machine difficult to light properly, and insufficient lighting is dangerous, since the rolls work in the open. The problem has been solved in some mills by placing a small mercury vapor tube in the hood itself, where due to the diffused character of the light, it eliminates all confusing and dangerous shadows on the rolls. Workmen in places where this has been done say it makes the job lighter, and much more comfortable, and takes away the constant fear of an accident due to insufficient illumination.

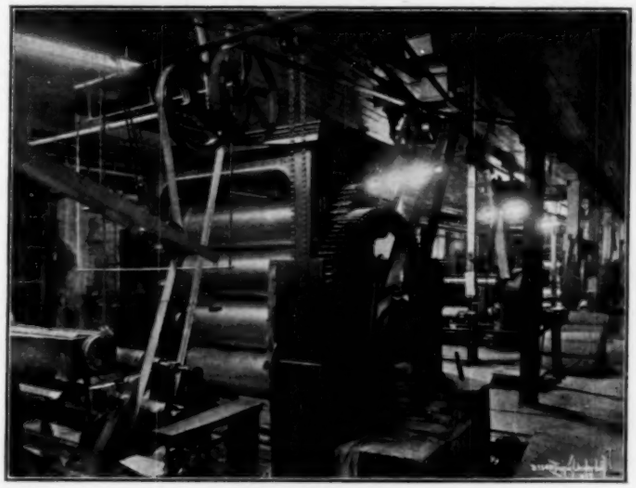
The lighting of calenders is fully as important although for somewhat different reasons. The constant watchfulness necessary to spot flaws in the moving sheet of rubber requires good lighting, while the fact that the rolls are directly above each other in a vertical line makes it difficult to light the bottom and top rolls evenly. The diffused glow of the Cooper-Hewitt tube makes it as easy for the operator to locate a flaw at the bottom as at the top, and the effect the light has of apparently magnifying small details increases the facility of inspecting the sheets. Naturally it aids the lamps to have



An Example of Efficient Illumination of a Rubber Mill

them expertly placed, for instance the tube for lighting a calender should be placed at right angles to the rolls in order to gain the highest degree of shadow illumination.

Owing to the fact that it is more chromatic, and in the spectrum range of greatest visibility—blue-green—the light, as stated before has the quality of making small details stand out with great distinctness, and this without any extra strain on the eye of the operator. Therefore in departments where very accurate work is essential such as cutting and matching fabrics, where boot tops and soles are made, or in tire making rooms where layers of fabric are wrapped on the cores, the flood lighting effect, and the fact that the dark colors of the fabric do not affect the prominence of detail are very valuable assets. In the latter process, wrapping the cores, the fact that the men have to approach the work from various angles makes the absence of shadows essential, otherwise the continual lapping of edges to fractions of an inch would cause great strain on the eyes. In the cord tire departments of the Hood Tire Company plant near Watertown, Mass., it is claimed that the Cooper Hewitt light is responsible for the reduction in



Calender Illuminated by Mercury Vapor, Note Absence Of Shadows on the Rolls

the percentage of "seconds" from several per cent to one-half of one per cent, and this holds true equally for night as well as day production.

The increase in production, the reduction in the percentage of inaccurate work and the elimination of danger from accidents have caused manufacturers who have installed them to consider the mercury vapor lamp a valuable aid to their factories. Besides these it should be taken into account that by elimination of eye-strain, with its consequences of quick fatigue, nervousness, and general lowering of morale, the employes feel much better toward their jobs; a feeling that cannot help but react favorably toward the company by which they are employed.

Production of "Standard" Plantation Rubber

The superiority of Para rubber over plantation rubber is traced back and the latter for various causes always shows varying results. It is now ascertained that very good results are obtained if the coagulate is allowed to stand for three days by itself. According to Maude and Grosse, the so-called M.C.T. process, the rubber is allowed to stand quietly in containers filled as full as possible without the addition of and acid until the coagulation is complete. Then the rubber is worked up into crepe from the coagulate. Calcium salts may be added to the latex in order to accelerate the coagulation. The formation of bubbles in the production of sheets may be diminished by working under pressure. According to the author by following this method a "standard" plantation rubber may be produced. For the period of standing quietly three days are necessary. There appears either putrefaction or a dark colored formation the latter chiefly on the surface.

M. Barrowcliff Journal, Soc Chem. Ind. 37—T 95.

German Rubber Trade Regulations

The German Government Department for the Control of Rubber Imports and Exports recently constituted, commenced its activities on May 10th, 1920 and has now issued its regulations and a statement of the principles by which it will be guided. The Control Office (Aussenhandelsnebenstelle Kautschuk, Berlin, C. 2, Neue Friedrichstrasse 51/52) supersedes the Departments hitherto charged with the regulation of rubber import and export matters, and also takes over duties hitherto discharged by the Zentral-Verein Deutscher Kautschukwaren-Fabriken. Arrangements, it is stated, have been made for dealing with every application within 24 to 28 hours.

The jurisdiction of the Aussenhandelsnebenstelle Kautschuk covers all matters relating to the admission or export of the following articles (each of which is preceded by its number in the German Customs Tariff):—

(98 a) Raw rubber*; (98 b) raw gutta-percha*; (98 c) raw balata*; (98 d) rubber, gutta-percha, and balata waste*; (98 e) factis and other rubber substitutes; (345) rubber and gutta-percha cements; (570) rubber in solution; (571) soft rubber compounds and sheets, rubber cuttings (untreated), unvulcanized rubber sheets with wire reinforcement, gutta-percha paper; (572) cut sheets (patent sheets) from rubber, not vulcanized and untreated; (573 a) rubber thread, unspun; (573 b) rubber thread, spun; (574 a) inner tubes for motor tires; (574 b) inner tubes for cycles, etc.; (574 c) other rubber tubes or hose; (575) driving belts, woven, with rubber; (577) rubber shoes; (578 a) solid rubber tires; (578 b) motor tire covers; (578 c) cycle tire covers; (579 a) rubber sheets with insertion; (581) rubber press cloths for factories, card clothing; (582) hard rubber compound, unvulcanized; (583) hard rubber paste for dental purposes; (584) hard rubber in sheets, rods, pressed pieces, etc.; (585) hard rubber tubes; (586) other hard rubber goods; (946) children's toys, rubber balls, dolls, etc.

*Imports exempt from control see (1) in next paragraph.

Raw Rubber Imports at Present Exempt From Control

As regards imports, the following regulations (in accordance with the findings of the Committee of the Aussenhandelsnebenstelle Kautschuk) are now in force:—

(1) The imports or raw rubber, gutta-percha, balata, and of old rubber are outside the jurisdiction of Aussenhandelsnebenstelle Kautschuk for the duration of the proclamation of September 16th, 1919, by the Ministry for State-Economics regarding free importation of these raw materials. (Import-Permits are not required for these raw materials, as the proclamation of September 16th, 1919, expressly provides for the import of these raw materials without import permits.)

Imports of Rubber Goods Permissible Only Under Certain Conditions

(2) Imports of manufactured and semi-manufactured rubber goods are not allowed on principle, in the interest of protection of the home industry. Exceptions will be allowed in respect of goods that are absolutely necessary for the maintenance of German economics, subject to proof that they cannot be procured at all from German sources or not within a reasonable time.

The simple declaration that such is the case will not suffice, and the applicant must furnish proof by exhibition of original documents. Or otherwise, if required, the Vice-Governor shall find out by inquiries from the manufacturers of that particular line whether they are in the position to cover the home demand at economic prices, and if so in what reasonable period.

Regenerated Rubber and Substitutes

(3) The import of regenerated rubber is allowed until the limit of 5,000 tons imposed by the Ministry for State-Economies for the year 1920 has been reached.

(4) The import of rubber substitutes from oil bases (Factis) is not allowed, unless proof is submitted that the quantities and qualities required are unobtainable within Germany.

(5) The import permits are valid for three months from the date of their execution.

Export Regulations

The export regulations are as follows:—

(1) The export of raw rubber, gutta-percha, balata, and of old rubber is permitted.

(2) The export of manufactured and semi-manufactured rubber goods is permitted, provided the selling prices are not below the lowest selling prices ruling on the home market.

For the export of goods included in the list of goods dealt with by the Convention on Prices of the Verband Deutscher Hart- und Weichgummiwarenfabriken, E. V. Leipzig-Volkmarsdorf, certain guiding rules have been laid down by the Convention, and these must be observed by the Aussenhandelsnebenstelle Kautschuk when granting export permits. It is advisable to get into touch first with the said Convention for obtaining the necessary particulars, before applying for the export permit.

(3) The export of reclaimed rubber is permitted.

(4) The export of rubber substitute (Factis) is permitted, with the exception of such products containing turnip-seed oil. Under certain assumptions the export of rubber substitute containing turnip-seed oil may be permitted exceptionally.

(5) The exporter shall be at liberty to invoice his goods for export in home or foreign currency.

(6) The export permits are valid for three months from the date of issue.

Charges to Defray the Working Expenses Of the Control Office

The following are the charges which are made by the Control Office for import and export permits:—

(1) For import applications 1 per cent. of the value of the invoice of the shipper from abroad; minimum tax 1 mark.

(2) For export applications 1 per cent. of the value of the *pro forma* invoice or of the copy of invoice; minimum tax 1 mark.

(3) The fees will be collected on delivery of the permit, a debit note being enclosed, including the cost of postage and collecting fee.

(4) No charge will be made for refusal of applications.

(5) For any permits that have been granted and have not been made use of, half the sums collected will be allowed on return of permit, together with the application for refund.

(6) For extensions of time of the validity of the permits for import and for export, half the fees will be charged.

(7) For calculations of the value of goods purchased in foreign currency or sold abroad invoiced in foreign currency, the average rates of exchange fixed by the Reichsbank in regular intervals, by order of the State Commissioners for export and import permits, shall be used, and not the daily rate of exchange of the foreign currency.

It is advisable that every applicant for permit in respect of goods invoiced in any foreign currency should supply particulars of his own rate of exchange employed, together with the corresponding value in German marks. Such particulars may be required for calculations of the rate of exchange, in cases where the Reichsbank has not supplied any average rate of exchange.

When dealing with the Aussenhandelsnebenstelle Kautschuk German importers and exporters are requested to observe the following rules:—

All applications for import and for export permits should be executed in triplicate on the official forms (obtainable from the Aussenhandelsnebenstelle Kautschuk, and should be lodged together with the original foreign invoice in the case of imports, or together with a *pro forma* invoice or invoice copy in respect of exports.

Applications not lodged in triplicate, or without the invoices required, will prevent the immediate reply to the application. With the view to avoiding delay it will be also necessary that the application forms should be carefully, completely, and legibly executed. In the case of application for export, the destination, together with the country of destination and full name and address of the consignee, should be furnished.

Firms applying regularly for export permits must themselves number their applications in their proper sequence, which would facilitate investigations, etc.

For each individual consignment (but not for each separate package), the application must be lodged in triplicate, together with the invoice.

India Rubber Journal, London, England.

Erie Issues House Organ

One of the newest house organs in the rubber industry is the "Erie Re-Cord-er" a monthly publication issued by the Erie Tire & Rubber Co., of Sandusky, Ohio. The paper consists of eight well-printed and illustrated pages and is being sent to Erie dealers throughout the country.

News from the Industry at Large

Dunlop Tire and Rubber Co. Announces Plans in Connection With New Plant in Buffalo, N. Y.—Delion Purchases Dreadnaught Plant—Peachey Process Company Formed in England

Dunlop Announces Plans

An interesting point in connection with the production plans of the Dunlop Tire & Rubber Company of Buffalo, is that present plans do not include manufacture of fabric tires. The entire capacity of the great Buffalo factory—estimated at 12,500 tires daily—will be devoted to solid truck tires and pneumatic cord tires and inner tubes for trucks, passenger cars and motor cycles. Passenger car tires will be in both large and small sizes, including Fords. This production can easily be doubled without materially increasing the floor space of about one and one quarter million square feet.

In general, the plan consists of an arrangement in groups, each of three parallel buildings 560 x 120 feet so located and spaced that the capacity can be doubled without interfering with operation of the original units. These groups of buildings are located on opposite sides of a covered roadway upon which all materials used in construction will be quickly and uninterruptedly transferred. The finished product will then be conveyed to the giant four-story warehouse 546 x 162 feet.

This plan has certain advantages of interest to production engineers and others. It assures proper convergence of parallel operations and continuity of serial operations by the shortest routes. This in turn, increases production in proportion to floor-space and number of men employed.

Again the doubling of plant capacity is made possible without changing the basic scheme for routing or doubling the total amount of floor space or interfering with work in process.

With all main factory buildings of one-story monitor type, Dunlop will secure rapid routing of product, good lighting and easier increase of plant capacity.

Time saving conveniences and direct routing, with their attendant economy, is evident in many detailed features of Dunlop factory construction. The roadways, for example, for both employes and materials, will be covered and therefore practically immune from the uncertainties of inclement weather and other natural impediments common to large manufacturies.

Office space for foremen, inspectors and other factory executives will be located on this roadway, thus giving the occupants direct ingress and egress with greatest convenience, and obviating the necessity of cutting up actual factory floor space for office use.

Power will be supplied from Niagara Falls and the plant of the Buffalo General Eelectric Company. Purchased power has been adopted as a safe-guard against possible coal shortages and transportation difficulties, and in order that production might be started or increased, without waiting for additional buildings and equipment.

To further facilitate production the Dunlop Company has purchased a textile mill at Utica, New York. This acquisition is in line with the Dunlop policy for protection against fluctuations in raw and partly finished material supply, as well as control of quality.

The efficiency of the construction company has led to rapid progress toward the completion of the great Dunlop factories. The date of formal opening of the plant has not yet been announced but it is expected that production will be fairly underway very early in 1921. Then America will have her first real opportunity to test the merits of an already highly successful cord tire.

PLANT OF GOODYEAR TIRE & RUBBER CO., LOS ANGELES, CAL.

Delion Buys Dreadnaught Plant

The Delion Tire & Rubber Company, of Baltimore, Md., has purchased the plant and equipment of the Dreadnaught Tire & Rubber Company of the same city.

They will make extensive alterations and improvements and in addition, considerable new machinery will be added to the plant, which now has a daily capacity of 500 tires and 1,000 tubes per day. The plant will be in operation in ninety days, and will produce the well known Delion tires and tubes. John W. Price is president; W. C. Price, vice-president in charge of sales; R. B. Arnold, vice-president in charge of manufacture; R. L. Swats, sales-manager.

McNerney to Manage Credits

The B. F. Goodrich Rubber Company announces the appointment of J. L. McNerney as Northwestern credit manager, with headquarters at Seattle.

Until recently Mr. McNerney has been connected with the Seattle branch of the Valvoline Oil Company. His past experience fits him particularly for the duties of his new position.

Peachey Process Company Formed

Word has been recently received from England that a company has been formed for the purpose of acquiring the new process of vulcanization discovered by S. J. Peachey. It is stated that the Peachey Process Company, Ltd., has been organized with a share capital of £250,000 to obtain from a syndicate consisting of J. W. Bartholomew, J. Higginbotham and A. Herring-Shaw, the patent rights for the United Kingdom of S. J. Peachey's Patent No. 129,826 of 1918. This patent covers the inventor's new process for the cold vulcanization of rubber which has received so much recent comment in the press both of Europe and America.

It is also stated that the vendors will transfer to the company the benefit for the applications for the corresponding patent rights which have been made in the United States, France, Belgium, Germany, Austria, Czecho-Slovakia, Poland, Hungary, Slovenia, Italy, Spain, Portugal, Switzerland, Holland, Roumania, Finland, Russia, Japan, Canada, Sweden, Norway, Denmark, Australia, New Zealand, South Africa, India, Argentina, Malay States and Newfoundland, in consideration of the company paying them fifty per cent of all amounts received by the company on the outright sale or exploitation of such foreign patents.

The company plans to enter into negotiations with manufacturers of rubber goods, linoleum, imitation leather goods, boot, shoe and heel substitutes, upholstery and wall coverings for the purpose of arranging with such firms to undertake the manufacture of a number of new as well as improved articles of common use which will be made possible by the greatly lessened initial costs of the Peachey process. The company has announced that following an investigation into the nature of the classes of goods to be manufactured it will either issue licenses for the use of the process or will join with the firm in question in promoting subsidiary companies for the purpose, or enter into other arrangements.

In addition to the foregoing steps will be taken for further research into the possibilities of further uses for the process. In this connection it is announced that the company has engaged Mr. Peachey's services exclusively.

Sterling and Empire Amalgamate

Announcement was recently made of the organization of the Rubber Corporation of America through the amalgamation of the Sterling Tire Corporation and the Empire Rubber and Tire Company. The new corporation has taken over the entire selling organizations of the two manufacturing companies. In all other respects the two companies will remain separate and distinct, there having been no change in the controlling interests of either.

It is stated in an official announcement that the object in forming the new sales company was to increase efficiency and secure economy in branch operations, to maintain larger stock of goods in centrally located store houses, to consolidate advertising effort and to relieve the heads of the manufacturing departments of all details of selling and financing sales.

The organization of the Rubber Corporation of America is as follows:

President and General Manager, Francis I. Reynolds, recently a sales manager of United States Rubber Company and prior to that sales manager of Goodrich-Diamond Rubber Company. Mr. Reynolds is recognized as one of the leading sales executives in the rubber industry and associated with him are his former sales-lieutenants from the United States and Goodrich Companies, who will be divisional sales managers. W. A. Reynolds, formerly sales engineer of mechanical goods for United States Rubber Company, is in charge of the mechanical division; Vice President and Advertising Director, Charles Austin Bates, well known in the field of advertising and sales promotion and Chairman of the Executive Committee of the Sterling Tire Corporation; Treasurer, Wm. M. Pepper, of Campbell Heath & Company, bankers, 5 Nassau Street, New York, who has full charge of the finances of the corporation.

These officers with the following, constitute the board of directors: General C. E. Murray, director and for many years president of the Empire Rubber & Tire Company; C. E. Murray, Jr., vice-president and treasurer of the Empire Company; Wm. T. Baird, president of the Baird Rubber Trading Company, New York; Joseph A. Miller, director and treasurer of Sterling Tire Corporation since its organization in 1908.

Other officers are: Comptroller, A. N. Alexander, who was until recently comptroller and efficiency supervisor of the Fisk Rubber Company; Assistant Treasurer and Cashier, Wm. A. Ryan, formerly of Marwick, Mitchell, Peat & Company, Certified Public Accountants, and more recently auditor of the Sterling Tire Corporation; Secretary, A. W. Fargo, of Campbell, Heath & Co.

The general offices of the Rubber Corporation of America are at 240 West 55th Street, New York City. Branches have been taken over in Boston, Philadelphia, Pittsburgh, Chicago, Kansas City, Newark, Paterson, Jersey City, Passaic, Rutherford, Syracuse, Cleveland, Detroit, Indianapolis and Washington. Additional branches are to be established in Atlanta and San Francisco.

New Courses in Rubber Technology

Arrangements have been completed for restarting the courses on rubber technology which were commenced some years before the war at the Northern Polytechnic Institute, Holloway, London, N. The courses were then, it will be remembered, under the direction of Frederick Kaye, A. R. C. Sc., and were conducted with considerable success. Since 1915, when the war put a stop to this promising development, members of the rubber trade in London and South of England, and trade aspirants, have been without the opportunity which the courses afforded of improving their technical knowledge in the directions in which they felt it to be incomplete.

There will be altogether three courses available for intending students. There will be a day course intended for students who already possess a degree of one of the universities, or a technical training in chemistry to which there is only to be added a special training in the chemistry of rubber. From this course, it is confidently anticipated, will be turned out recruits suitable for absorption in the research institutions in connection with the rubber industry, or capable of at once taking up important work at chemists in rubber factories. A thorough training in rubber research work will be given.

There will be in addition two evening courses, one intended for men of good position in the rubber industry who are unable to attend during the day, the other of a more elementary nature. All three courses are intended to commence toward the end of September. The courses are to be conducted by Dr. Philip Schidrowitz, an authority who requires no introduction to the industry in this country, he is known as having done a great deal of original work, much of it on fundamental principles. In securing Dr. Schidrowitz, who will also have expert assistance, the authorities of the Northern Polytechnic Institute have done much to ensure the success of the courses.

A further matter which deserves notice is the fact that arrangements are being made to effect large extensions in the rubber plant available for instructional and testing purposes at the Polytechnic.

Alexander With Owen Tire

A. F. Alexander of Philadelphia, Pa., formerly manager of the tire department of the Utilities Sales Corporation, has recently been made Chicago district manager for the Owen Tire & Rubber Company, with headquarters at 2636 So. Michigan Avenue. Mr. Alexander is a man of wide experience in the industry, having been associated with the Goodyear Tire & Rubber Company, Fisk Rubber Company, Portage Rubber Company, Amazon Rubber Company, in various capacities prior to assuming his present duties.

Fisk Sales Increase

The Fisk Rubber Company, of Chicopee Falls, Mass., reports sales for the first six months of the current year in excess of $27,000,000, or 32 per cent greater than during the corresponding period last year. Even if the company should be affected by a general let up on account of general conditions, it is estimated that gross sales for the full year will be not far from $50,000,000. There was an increase of about 35 per cent in the output of casings and other lines, such as inner tubes and solid tires, increased about 33 1-3 per cent . The percentage of cord tire production to the total output has doubled from 10 per cent to 20 per cent, this being considered significant as the trend of tire buying is toward the cord product away from the fabric. Although production has increased, the company is understood to have improved its financial position, a reduction of 20 per cent shown in bank loans and commercial paper.

Goodrich Announces Dividend

The usual dividend of $1.75 a share on the preferred stock, payable October 1, to the stockholders of record of September 21, and the quarterly dividend of the common stock of $1.50 a share, payable November 15 to the stockholders of record November 5, was declared by the directors of the B. F. Goodrich company.

Though the profits of the company are not running quite so high as in 1919, as shown by the semi-annual balance sheet issued recently, the concern, it is proven by the statement, is on a sound financial basis.

The net profits for the half year, making full provision for maintenance charges, depreciation, interest on borrowed money, doubtful accounts and all outstanding liabilities, but before providing for federal income and profit taxes, were approximately $7,600,000, it is shown by the report.

Chemical Industries Applications Increase

With accepted applications for space near the 400, mark, a new record, the preliminary details of the Sixth National Exposition of Chemical Industries in Grand Central Palace, New York City, Sept. 20 to 25, inclusive, make certain that the show will outclass the five previous ones.

On the afternoon of Thursday, Sept. 23, the Chemical Engineering symposium will take place. The American Institute of Chemical Engineers will hold a meeting in the Palace, in the afternoon, and papers of great interest will be read. In the evening the engineers will have a dinner at the Technology Club.

Three other symposiums will be held during the week. One will be on Fuel Economy, one on Materials Handling, and one on Industrial Management. The Fuel Handling Division and the Material Handling Division have developed such progress that it is necessary to give each a separate section at the coming exposition. Important topics will be discussed on the days these two divisions meet.

Personals of the Rubber Trade

Mason Creates New Positions—Foljambe With California Goodyear—DeVoe Branch Manager for Madison—Standard Four Promotes Shaw—Duerston President of New Castle—New Hawkeye Officers Elected

Mason Creates New Positions

There has been created, as a part of the sales organization of the Mason Tire & Rubber Company, of Kent, Ohio, the positions of eastern and western district sales manager.

In creating these new positions it is the aim of the sales department to afford the branches and their dealers with additional co-operation in a way that cannot be accomplished by the branches themselves.

The western district managership includes all branches west of the Mississippi River, together with Chicago, Milwaukee and Indianapolis branches east of the river. The eastern managership comprises all branches east of Indianapolis.

H. C. Smith, who takes the position of western district manager is a man thirty-four years old, his early education having been received in the office of a country news paper in a small Missouri town. At the age of seventeen he went to Kansas City and after connections with several industries in that city he became attracted to the automobile tire business. He joined one of the large tire companies in the city of Akron and for six years he served in practically every department of the company.

In the spring of 1917 the Mason Tire & Rubber Company attracted his attention and he joined the selling organization at the Kansas City branch, where he later became branch manager.

His ability as manager of this branch led to his transfer to the position of western district manager.

The position of eastern district sales manager will be filled by Earl W. McCreery, formerly of Akron, Ohio, who has had nearly twenty years' experience in the tire industry.

For a period of fifteen years starting as an office boy in the laboratory, he was affiliated with the B. F. Goodrich Company of Akron. For a period of four years during this time he was employed in every department in the organization and later was made district manager of the northwest, with headquarters at Minneapolis. This position he held for a period of eight years.

For some time after leaving the Goodrich Company he acted a personal representative to the general sales manager of the Republic Rubber Corporation and while in this position was offered the opportunity of becomng acquainted with sales conditions all over the country.

Prior to his affiliation with the Mason Tire & Rubber Company he held the position of assistant sales manager with the Portage Rubber Company of Barberton, Ohio.

Foljambe With California Goodyear

E. S. Foljambe, widely known throughout the automotive industry as editor of trade publications and an official of the Society of Automotive Engineers, has joined the forces of the Goodyear Tire & Rubber Company of California at Los Angeles, as a special representative of the motor truck tire department.

Mr. Foljambe more recently was directing editor of the Chilton publications. A member of the S. A. E. since its inception, Mr. Foljambe has for years been one of the most prominent automobile engineers in the country and has had an important part in many of the advance steps made by the industry. He joined

E. S. Foljambe

the S. A. E. in 1903 when the membership was but twenty, became vice-president and a member of the council of ten in 1916. He also holds many honorary memberships in various automobile and trade associations. During his fifteen years of editorial work he has read many papers and delivered many talks for various organizations.

Being well versed in all angles of the automotive industry, he will make a valuable addition to the California Goodyear organization doing educational speech-making in "motorize the farm" campaigns. He will also engage in special sales promotional work.

DeVoe Branch Manager for Madison

Announcement has recently been made by the Madison Tire & Rubber Company, Inc., to the effect that R. L. DeVoe has been appointed manager of the Chicago branch of the company. Mr. DeVoe has had eighteen years experience in the tire industry and is thoroughly familiar with all its phases. During this time he has traveled from one end of the country to the other calling on dealers, jobbers and distributors.

Standard Four Promotes Shaw

J. Elden Shaw, formerly sales manager of the Savage Tire Sales Company, of Des Moines, Iowa, has been appointed district manager of the Standard Four Tire Company's Pacific Coast business, with direct charge of the Los Angeles branch of that concern.

Mr. Shaw has been closely connected with the tire business on the Coast for at least ten years. In the beginning, he started with the L. S. Vulcanizing Company, of Los Angeles. Four years later he was appointed credit man in the Los Angeles branch of the Savage Tire Company, later being transferred to the factory as credit manager; then promoted to traveling auditor and soon to special salesman. In 1919 he was made sales manager for that concern, with headquarters at Des Moines. The appeal of the coast, however, proved too strong, and when the Standard Four Tire Company's opportunity presented itself, he lost no time in getting back to his old home country and among his many friends in the trade.

"Because of Mr. Shaw's wide acquaintance on the Coast and his long experience in the executive handling of tire business in that territory, we feel that we were very fortunate in securing his services," said F. R. Eyer, general sales manager of the Standard Four Tire Company, in announcing Mr. Shaw's appointment as district manager.

Duerston President of New Castle

W. E. Duerston was recently elected president of the New Castle Rubber Company, New Castle, Pa. This action was taken at a meeting of the board of directors. Mr. Duerston has been vice president of the company since its start there. He takes the place of President J. Frederick Seiberling, who resigned. No one has been chosen as vice president.

H. W. Smith, formerly assistant to the president of the Firestone Company, was elected treasurer and director of the company to take the place of Robert E. Richardson, who resigned.

These promotions come as the result of the great progress made at the plant, and the big record piled up within the last few months. Plans for the future are for a bigger plant so that production may be doubled.

New Hawkeye Officers Elected

The Hawkeye Tire and Rubber Co., of DesMoines, Iowa, announced recently the election of John C. DeMar as secretary and George L. Rowe as treasurer. These two men fill the offices vacated by C. B. Hextell, who has resigned as secretary and treasurer. Mr. De Mar is a practicing attorney, and is also assistant United States district attorney for the southern district of Iowa. He was a member of the Iowa Legislature at one time. He is one of the owners of the new Broadway Building, which was recently erected near 15th-st. and Grand-ave., Des Moines.

Mr. Rowe is cashier of the Mechanics Savings Bank and is also a director of the Grimes Canning Co., which is one of the largest concerns of its kind.

Recent McGraw Promotions

Announcement is made of the appointment of C. E. Pumphrey, formerly assistant sales manager of the McGraw Tire & Rubber Company, to the position and title of general sales manager, in the place of H. M. Bacon, who has resigned. Mr. Pumphrey has been associated with the company for the past seven years.

Coincident with this announcement comes word of a number of other appointments in the company's sales personnel. W. H. Hurley, manager of the New York branch, is made assistant sales manager, with headquarters at Cleveland, Ohio. W. A. Brady, who has been connected with the New York branch, assumes management of that territory. G. E. Bovis, Cleveland manager, goes to Chicago to fill the vacancy created by the transfer of H. G. Couturier to the general office headquarters in the capacity of sales promotion manager, a newly created department. R. I. Winterringer, of Boston, takes charge of the Cleveland territory, while W. P. McGlynn will assume the Boston post.

During the first six months of the present year, the company's business shows a very substantial growth and the outlook for the remainder of the year, according to President Morgan, is most promising. The McGraw policy of conservative expansion is working out along scheduled lines and officials hold a very optimistic view of the future.

Mason Promotes Deamud

W. S. Deamud, who for the past several years has been one of the salesmen of the Chicago territory for the Mason Tire & Rubber Company, Kent, Ohio, has been made manager of the Kansas City branch to succeed Mr. Smith who has become the western district sales manager.

Mr. Deamud was born and raised in the state of Illinois, his early life being spent in the city of Chicago. For several years he was interested as president and secretary of a wholesale florist company, the J. B. Deamud Company.

Upon entering the tire business his first connection was with the Fisk Rubber Company at its Chicago branch. He later was affiliated with the sales force of the United States Rubber Corporation and the Racine Rubber Company. It was on December 23, 1917, that he joined the Mason organization as salesman, traveling the Illinois territory for the Chicago branch. He later traveled the state of Wisconsin, northern Illinois and part of the state of Iowa, and is directly responsible for the landing of one of the Chicago branch's largest accounts, Morehouse & Wells Company of Decatur, Ill.

McCone Joins Columbia Forces

The selection of men who will hold places of importance on the technical and production staff of the Mansfield, Ohio, plant of the Columbia Tire & Rubber Company is being made rapidly, according to the announcement of G. W. Henne, president and general manager. The latest addition to the staff is C. W. McCone, of Akron, who will become consulting engineer of the company.

Mr. McCone is a graduate chemist and an expert in the production of cord tires. He will have complete charge of compounds and production of cord tires both at the Mansfield plant as well as the one in Columbiana which is now under way.

Johnson Joins Cleveland Firm

Announcemnt of the reorganization of the Ramsdell Bros. Co., 2102 Euclid avenue, made last week, reveals the information that C. R. Johnson for the last nine years with the Goodyear Tire & Rubber Co., Akron, has been named vice president and treasurer.

Mr. Johnson, a major in the chemical warfare service during the war, was manager of Goodyear's development department when he resigned recently to accept the Cleveland position. Before the war he was chief chemist for Goodyear and in this and subsequent capacities became familiar with all phases of tire construction.

R. B. Wilson, former vice president, has been made president. Service facilities for truck owners using Goodyear tires are maintained at 3430 Superior avenue N. E.

Marked Increase in Exports

Statistics recently compiled by the Bureau of Foreign and Domestic Commerce of the Department of Commerce, Washington, D. C., show a considerable gain in exports of manufactured rubber goods for June, 1920, as compared to June, 1919. The value of exports for June, 1920, totalled $6,615,386 as compared to $5,727,836 for June, 1919. Exports for the twelve months ending June showed a decided increase in value for 1920 as compared to 1919 and 1918. The value of exports for the twelve months ending June, 1920, amounted to $69,226,716 as compared to $43,856,782 for the corresponding period in 1919 and $33,343,181 for the twelve months ending June, 1918. Complete statistics for the above-mentioned periods are as follows:

Articles, and Countries to which exported.	JUNE				TWELVE MONTHS ENDING JUNE					
	1919		1920		1918		1919		1920	
	Quantity.	*Value.*	*Quantity.*	*Value.*	*Quantity.*	*Value.*	*Quantity.*	*Value.*	*Quantity.*	*Value.*
India rubber, manufacturers of:										
Scrap and old.....lbs..	473,282	$62,904	736,559	$64,026	2,117,257	$235,811	3,886,049	$436,009	12,899,733	$1,080,322
Reclaimed .....lbs..	500,175	81,904	488,899	78,434	3,284,958	567,278	3,669,693	616,802	5,777,372	927,729
Belting, hose, and packing..	.....	585,337	.....	.....	.....	4,578,396	.....	5,716,210	.....	[1]2,688,785
Belting	.....	.....	.....	289,271	.....	.....	.....	.....	.....	[2]1,426,500
Hose	.....	.....	.....	225,026	.....	.....	.....	.....	.....	[2]1,330,760
Packing	.....	.....	.....	104,615	.....	.....	.....	.....	.....	[2]649,960
Boots and shoes—										
Boots .....pairs..	29,356	71,306	15,744	57,020	1,559,598	4,861,213	421,590	1,590,001	338,817	1,015,657
Shoes .....pairs..	528,651	395,970	749,154	720,684	1,244,170	913,128	2,690,635	2,577,052	9,544,180	8,280,338
Druggists' rubber sundries	.....	146,461	.....	129,485	.....	884,245	.....	1,019,170	.....	1,530,326
Tires—										
For automobiles	.....	3,236,424	.....	.....	.....	13,977,671	.....	22,630,200	.....	[1]13,732,181
Casings	.....	.....	.....	3,186,857	.....	.....	.....	.....	.....	[2]22,127,360
Inner tubes	.....	.....	.....	474,240	.....	.....	.....	.....	.....	[2]2,229,101
Solid tires	.....	.....	.....	283,248	.....	.....	.....	.....	.....	[2]1,831,135
Total	.....	3,236,424	.....	3,944,345	.....	13,977,671	.....	22,630,200	.....	39,919,777
Exported to—										
France	.....	192,628	.....	108,391	.....	661,648	.....	3,227,830	.....	2,445,034
Norway	.....	104,504	.....	114,638	.....	525	.....	390,640	.....	1,255,698
Spain	.....	104,160	.....	173,379	.....	12,233	.....	416,040	.....	1,477,636
Sweden	.....	189,370	.....	125,597	.....	.....	.....	505,001	.....	2,507,202
United Kingdom ..	.....	143,718	.....	228,432	.....	618,071	.....	832,492	.....	2,778,897
Canada	.....	158,293	.....	339,172	.....	1,766,518	.....	961,352	.....	1,874,919
Panama	.....	39,517	.....	74,242	.....	137,609	.....	286,370	.....	407,343
Mexico	.....	74,879	.....	75,372	.....	777,984	.....	1,001,233	.....	829,995
Cuba	.....	97,390	.....	193,004	.....	1,336,233	.....	2,009,263	.....	2,207,168
Argentina	.....	470,123	.....	76,728	.....	1,649,840	.....	1,837,884	.....	2,154,359
Brazil	.....	32,637	.....	75,517	.....	455,102	.....	667,319	.....	1,275,171
Chile	.....	163,966	.....	35,965	.....	725,876	.....	1,130,873	.....	461,739
Uruguay	.....	10,438	.....	82,790	.....	224,694	.....	383,081	.....	811,109
China	.....	28,417	.....	23,436	.....	53,039	.....	224,480	.....	271,588
British India	.....	35,085	.....	77,782	.....	416,411	.....	447,856	.....	741,921
Straits Settlements	.....	56,730	.....	153,535	.....	214,887	.....	617,139	.....	973,281
Dutch East Indies	.....	28,907	.....	158,505	.....	347,912	.....	812,425	.....	1,114,380
Japan	.....	57,052	.....	19,958	.....	83,235	.....	354,908	.....	389,060
Australia	.....	126,071	.....	130,807	.....	819,755	.....	880,118	.....	944,624
New Zealand	.....	131,145	.....	242,113	.....	946,804	.....	884,503	.....	1,427,009
Philippine Islands .	.....	335,952	.....	387,513	.....	863,727	.....	1,412,929	.....	1,393,670
British South Africa	.....	28,588	.....	110,335	.....	693,065	.....	620,732	.....	845,058
Other countries ...	.....	626,854	.....	937,134	.....	1,172,503	.....	2,725,732	.....	11,332,916
All other tires	.....	259,014	.....	75,277	.....	1,130,623	.....	1,264,175	.....	1,250,638
Soles and heels	.....	.....	.....	74,309	.....	.....	.....	.....	.....	438,651
All other manufacturers of..	.....	889,151	.....	852,894	.....	6,194,816	.....	8,007,163	.....	[2]8,687,273
Total manufacturers of rubber	.....	5,727,836	.....	6,615,386	.....	33,343,181	.....	43,856,782	.....	69,226,716

[1] Figures are for six months, July to December, inclusive.

[2] Figures cover period beginning Jan. 1.

MARKETS

Manufactured Rubber Goods

NEW YORK, SEPT. 6, 1920

In common with all other big industries, the rubber industry has felt the sudden contraction of credits which has slowed down business activities all over the country, and has greatly curtailed business in many lines. With the uncertain situation at the present time, rubber men in general are operating on a very conservative basis, and are showing a tendency to go slowly.

The tightness of money hits not only the rubber manufacturer but it affects also the dealer in rubber manufactures, and has resulted in putting buying on a hand-to-mouth basis on many items. Distributors are now coming into the market for supplies only when the stocks are needed to take care of immediate requirements, and distribution is thus slower to some extent.

AUTOMOBILE TIRES

With many of the leading tire manufacturers working on a materially curtailed basis, the tire market is still in a very quiet position. Wall Street advices credit the tire manufacturing industry with accomplishing just what it has been studiously trying to avoid—overproduction. Whether or not there has been an overproduction, the slowing down of demand and the choking of distributing channels caught many tire manufacturers with large stocks on hand, and precipitated the present dull period in the industry.

It is believed now, however, that the worst of the brief slump is over.

It is certain however, in the opinion of leading tire men, that the industry will attain the record production which had been set for 1920, and this is just as well for the industry. With production curtailed, there can be no large surplus of tires to work against the market next year when producing costs will be materially lower if the present declines in the raw commodity markets continue.

MECHANICAL GOODS

A quiet market for mechanical belting is reported, the slowing down of manufacturing in many lines having reduced the call for transmission and conveyor belting. The long awaited orders for airbrake and steam hose from the railroads have not yet materialized to any extent, but large buying is looked for within the near future. Demand for rubber packing, both sheet and rod, is reported to be quiet for the moment. Manufacturers are doing a routine business in rubber mechanical specialities.

BOOTS AND SHOES

Rubber heel production is constantly expanding, and manufacturers are in the market for larger quantities of reclaimed rubber as a result of this condition. Repairmen are doing a record rubber heel business, and manufacturers of the more popular brands, those that are advertised, are working at capacity to take care of their business. Rubber and composition soles are also booming. Fall business in rubbers and rubber boots is reported to be fair, but buying at retail has not yet started, and the retailers are stocking up in a conservative manner this season.

MISCELLANEOUS

The slump in sugar prices, disastrous from the point of view of the trade, but welcome enough from the consumers' standpoint, has been a good incentive for housewives to do more home canning, and sales of rubber jar rings are going up by leaps and bounds. The season is more of a success than the most optimistic had expected.

Extensive construction work in many parts of the country has quickened the demand for plumbers' gaskets and other specialities, and sales are reported to be good.

Automobile rubber floormats, foot pads, and other appliances are selling more and more as the production of cars increases, and most garage men are now handling these products.

Cottons, Yarns and Fabrics

NEW YORK, SEPT. 6, 1920

The raw cotton market has shown some violent fluctuations during the past fortnight, and the tone has been irregular throughout. Continued slackness of general trade, taken in conjunction with a noticeable weakening of Southern spot values, have aided the market in its slump, and there are no signs of its having reached the bottom.

In view of the curtailed consumption of raw cotton, it is believed in the trade that the new crop, short though it is, will prove sufficient to take care of the trade's requirements, taken with the large carry-over of old crop cotton.

Spot demand has been lacking for several weeks past now, and with the new crop about to begin to move, growers in the South are showing much alarm. The American Cotton Association, composed of growers, is planning to hold off a large portion of the coming crop in an effort to bolster up prices, holding that present going values do not represent the actual cost of production. It is very doubtful whether or not the growers will be financially able to make good their threat of holding up the movement as the banks have not shown much enthusiasm in carrying merchandise held to await a price upturn, but, on the contrary, have actually forced sales in such instances.

Middling cotton in Southern markets has gone below 29 cents per pound, and the New York and other markets are headed for lower figures, many factors talking 22 cent cotton. In such an event we may expect to once again hear the "Buy a Bale of Cotton and Help the South" slogan.

EGYPTIAN COTTON

Preliminary reports on the new crop of Egyptian cotton indicate that there will be a big yield. Crop experts in Alexandria have estimated the new crop at about 7,500,000 cantars, by far the largest output since the large crop of 1913-14. American consumers are anticipating lower prices on the staple this year, in view of the large production.

SEA ISLAND COTTON

No improvement in the Sea Island cotton crop condition has been reported, and the yield this season will be a very disappointing one. More and more growers are turning from the cultivation of the long staple cotton to the growing of food products, and the acreage for next season is expected to be radically reduced. The Sea Island cotton is becoming less and less of a factor in the tire yarn market, but there is still a little being done.

ARIZONA COTTON

Cultivation of the American long staple cotton first developed in the Salt River Valley of Arizona, has now spread to several sections of California, and crops are now being grown in the San Joaquin, Coachella, and the Imperial Valleys of California, cultivation being increased as the demand for the product increases. The market for the long staple, however, has received somewhat of a set-back with the shutdown of tire manufacturing factories, and prices are easier in sympathy with the general trend downward.

TIRE FABRICS

There is no stable quotable basis of tire fabric prices available, and quotations are necessarily omitted. Spinners

of the fabric in the New England mill districts have closed down their plants rather than run the risk of flooding the market with stocks through overproduction. Tire manufacturers are not in the market actively at the present time, and supplies of the fabrics are being offered for sale to manufacturers in other industries at marked price recessions. The spinners are not expected to start up until the tire factories get under way in more normal volume.

DRILLS, SHEETINGS AND OSNABURGS

Continued quiet has been noted in the cotton goods market during the past two weeks, and the market is still in an easy position. The downward trend of prices in the raw cotton market are having a weakening effect upon the market for finished goods, and buyers are consequently holding off until they believe the market has hit the bottom. Most of the activity on the spot position centers in the offerings of speculators and second hand sellers who are offering prompt shipment cotton goods at prices considerably under mill quotations.

HOSE AND BELTING FABRICS

More weakness in cotton duck prices is to be noted in the Eastern market, prices being quoted lower on practically all varieties. Shoe ducks show a marked decline, being offered at 80 cents per pound. Single filling is held at 30 cents per yard, with double filling at 34 to 36 cents. Enameling is weakly held at 80 to 85 cents per pound, plus freight, price varying according to width.

TIRE FABRICS

17¼-ounce Sea Island, combed, sq. yd.			Nominal
17¼-ounce Egyptian, combed	—	@	—
17¼-ounce Egyptian, carded	—	@	—
17¼-ounce Peelers, carded	—	@	—
17¼-ounce Peelers, combed	—	@	—

DUCKS

Belting (pound basis) lb.	.65	@	—
Hose (pound basis)	.65	@	—
*Enameling	.80	@	.85
Shoe Ducks	.80	@	—
Single filling yd.	.30	@	—
Double filling	.34	@	.36

*Price varies according to width.

DRILLS

37-inch 2.35-yard yd.	.27	@	—
37-inch 2.75-yard	.21	@	—
37-inch 3.00-yard	.19	@	.19¼
37-inch 3.25-yard	.19	@	—
37-inch 3.50-yard	.17½	@	—
37-inch 3.95-yard	.13	@	.13½
37-inch 2.00-yard Southern	Nominal		
37-inch 2.00-yard Northern	Nominal		
40-inch 2.40-yard Southern	Nominal		
40-inch 2.40-yard Northern	Nominal		
52-inch 1.90-yard Southern	Nominal		
52-inch 1.90-yard Northern	Nominal		

SHEETINGS

40-inch 2.35-yard yd.	Nominal		
40-inch 2.50-yard	.24	@	—
40-inch 2.85-yard	.19	@	.19¼
40-inch 3.00-yard	—	@	—
40-inch 3.25-yard	Nominal		
40-inch 3.75-yard	.17¾	@	.18
40-inch 4.25-yard	.14	@	.14½

Note—In view of the unsettled conditions prevailing in the market at the present time, the prices quoted above are more or less nominal, and are not guaranteed.

BURLAPS
(Carload Lots)

	Cents Per Yard		
7 -ounce 40-inch	8.00	@	——
7½-ounce 40-inch	8.05	@	——
7½-ounce 45-inch	8.10	@	——
8-ounce 40-inch	8.20	@	——
8½-ounce 40-inch	8.40	@	8.50
10 -ounce 36-inch	10.00	@	——
10 -ounce 40-inch	10.15	@	——
10 -ounce 45-inch	Nominal		
10½-ounce 40-inch	10.20	@	10.30

* And higher, according to width.

Chemicals and Compounding Materials

NEW YORK, SEPT. 6, 1920

Increased freight rates, put into effect by the railroads during the latter part of August, have not resulted in any general advance in chemical and compounding materials prices. A few increases have been made to cover the added cost of the new railroad freight rates, but these advances have been generally insignificant.

With the warm summer months over, consumption is beginning to pick up somewhat, and the market has strengthened a little in consequence. No sharp price advances have been recorded, but the market is less inclined to weakness on some lines which have been declining during the past several months. Stocks of many products requiring barytes as a base continue light, and producers of the crude material are still unable to take care of all the business offering.

LITHARGE

A steady market for litharge is to be noted, and prices hold quotably unlook for any general resumption of this changed. Demand for spot goods is still in excess of available supplies, and producers are being pressed to accept business for forward delivery. Producers are well booked up for the remainder of the current year.

LITHOPONE

The edge has been taken off the demand for this product, but the producers have not felt this slackening, as their output is sold up far ahead. Brokers are offering some re-sale lots of lithopone, and it is presumed in the market that some consuming interests bought more than their requirements and are trying to dump their surplus on the resale market. Prices on the domestic hold unchanged. A little foreign is arriving from Belgium, but all on consignment, none being headed for the open market.

WHITING

Supplies of this product are somewhat more liberal, and producers are better able to take care of their business with freer receipts of the raw material reported. The market is being firmly maintained on all grades, however, demand being very keen. A little imported is arriving on the market.

BARYTES

Relief in the transportation situation is permitting producers of crude barytes to get their shipments out faster, but the manufacturers have found it an impossible task to catch up with their business held up during the recent emergency, when all railroad transportation was slowed down because of the strike and shortage of cars. Prices hold unchanged.

DRY COLORS

The trade is talking lower prices for dry colors later on in the year, but no marked reductions in prices are looked for unless the imports of foreign goods should show a heavy increase, German colors have been offering in fair volume, but holders have been unable to make sales unless they underquoted the domestic market. Blacks hold steady, but buying from rubber companies is reported to be slower. Other colors hold steady under routine demand.

ZINC OXIDE

Producers of zinc oxide report a big falling off in their business with the rubber manufacturing companies, but the market is being well maintained under an active demand from other consuming markets. Producers have a good volume of business booked ahead, and any temporary recession in demand has comparatively little effect upon the market.

Current Prices for Chemicals, Fillers, Colors, etc.

Acetone, carlots lb.	.21	@	.22
smaller lots lb.	.22	@	.23
Acetanilid, C. P., bbls. lb.	.55	@	.60
Acids, Acetic, 56 per ct. cwt.	8.40	@	9.15
Carbolic, C. P. lb.	.12	@	.20
Muriatic, 20 deg. cwt.	2.25	@	2.75
Muriatic, 22 deg. cwt.	3.00	@	3.25
Nitric, 42 deg. cwt.	8.00	@	8.25
Nitric, 40 deg. cwt.	7.25	@	7.75
Sulphuric, 60 deg. car lots tons	16.00	@	18.00
Sulphuric, 60 deg. car boys	19.00	@	21.00
Tartaric, crystals lb.	.76½	@	.77
Aluminum, Silicate	Nominal		
Aniline oil, bulk basis, Contract	—	@	—
Imported	Nominal		
Domestic	.26	@	.28
Antimony—			
Oxide lb.	.14	@	.15
Sulphuret, red lb.	.22	@	.25
Sulphuret, golden lb.	.28	@	.30
Sulphuret, crimson lb.	.45	@	.50
Alcohol, denatured, 190 proof	1.00	@	1.04
Wood, 95 per cent.	3.25	@	3.30
Ethyl, 190 proof	Nominal		
Aldehyde Ammonia	Nominal		
Ammonia, powdered	.17	@	.17½
Ammonium Carbonate, domestic lb.	.16	@	.16½
Amyl Acetate gal.	4.10	@	4.15
Anthracene, 80 per cent.	1.00	@	1.10
Anthroquinine, 95 per ct.	3.75	@	4.25
Asbestine	Nominal		
Asphaltum, Egyptian lb.	.20	@	.25
Domestic ton	.30	@	.40
Barium, dust	—	@	—
Sulphide lb.	.—	@	—
Barytes, prime white imported ton	Nominal		
white, domestic ton	35.00	@	40.00
off-color, domestic lb.	20.00	@	30.00
Southern, f. o. b. mills	23.50	@	25.00
Western, f.o.b. mills	23.50	@	26.00
Beeswax	.24	@	.65
Benzidine Base lb.	1.25	@	1.30
Benzol, 90 per ct. gal.	.33	@	.38½
Benzol, pure bulk, 100	.35	@	.40½
Blanc Fixe, dry, bbls. lb.	.06	@	—
Burgundy Pitch, dom. lb.	.08	@	.10
Foreign	.60	@	.65
Blacks, Drop lb.	.05½	@	.15
Ivory lb.	.16	@	.30
Carbon, gas, cases lb.	.12	@	.30
Lampblack R M. lb.	.12	@	.40
Mineral blacks ton	35.00	@	45.00
Blues, Prussian	.95	@	1.00
Soluble lb.	1.00	@	1.05
Ultramarine lb.	.15	@	.50
Browns, Umber, Turkey, burnt powdered lb.	.05½	@	.07
American, burnt lb.	.04½	@	.06
Cadmium, sulphide, yellow lb.	1.75	@	2.00
Carbon Disulphide, bulk lb.	—	@	—
Bisulphide lb.	.08½	@	.09
Casein, C. P. lb.	.35	@	.36
Castor Oil	.16½	@	.19
Caustic Soda, 76 per ct. cwt.	5.25	@	5.75
Chalk, precipitated, extra light lb.	.05½	@	.06
heavy lb.	.04½	@	.05
China clay, domestic ton	10.	@	20.00
imported ton	19.00	@	25.00
China Wood Oil, bbls. lb.	.16½	@	—
F.o.b. Pacific Coast	.14½	@	—
Chloroform, U. S. P.	.40	@	.45
Coal Tar Pitch	—	@	—
Cottonseed Oil, crude f.o.b. mills lb.	Nominal		
Prime summer yellow bbls.	11.75	@	12.75
Dimethylaniline lb.	.97	@	1.00
Elateron	—	@	—
Formaldehyde, spot lb.	.49	@	.51

Fullers Earth, powd., carload lots	17.00	@	—
Fossil flour lb.	.03¾	@	.05
Genasco Mineral Rubber	—	@	—
Gilsonite ton	55.00	@	65.00
Glue, extra white lb.	.35	@	.45
medium lb.	.30	@	.35
low grade	.22	@	.26
foot stock	.19	@	.22
brown foots	.19	@	.22
common bone	.18	@	.21
Glycerine, C. P. (drums) lb.	.28½	@	.29
cans	.30½	@	.31
Graphite, flake (bbl.) lb.	.14	@	.20
powdered (bbl.) lb.	.05	@	.10
Green, chrome, R. M. lb.	.42	@	.70
Ground glass (fine) lb.	.03½	@	.04
Hexamethylene lb.	1.95	@	—
Infusorial earth, powd'd. lb.	.02	@	.035
bolted lb.	.035	@	—
Iron oxide, red, reduced grades lb.	.13	@	.15
red, pure, bright lb.	—	@	—
Hexamethyenetetramine lb.	2.25	@	2.50
Kaolin	—	@	—
Lime, hydrated	—	@	—
Lead, red, dry (casks) lb.	.12¼	@	.12½
sublimed lb.	—	@	—
white, basic carb. lb.	.10½	@	.11
white, basic sulp. lb.	.10	@	.10¼
Lime flour lb.	—	@	—
Litharge (casks) lb.	.11¾	@	.12¼
English lb.	—	@	—
Lithopone, domestic, bbls. lbs	.08	@	.08¼
in bags lb.	.07¾	@	—
M. R. X.	—	@	—
Magnesia, carbonate lb.	.18	@	.19
calcined light lb.	.60	@	.65
Magnesite, calcined, pwd. ton	50.00	@	65.00
Magnesia Oxide, heavy	—	@	—
Light	—	@	—
Extra light	—	@	—
Napthalene lb.	.19	@	.21
Nirobenzol	.15	@	.16½
Naphtha, motor gasoline, (steel bbls.) gal.	.31	@	—
68 @ 70 degrees (steel bbls.) gal.	.38	@	—
70 @ 72 degrees (steel bbls.) gal.	.39	@	—
73 @ 76 degrees (steel bbls.) gal.	.41	@	—
machine (steel bbls.) gal.	.50	@	—
Oil corn, crude factory cwt.	11.06	@	—
corn, ref. (bbls.) cwt.	14.96	@	—
linseed, (bbls.)	1.37	@	—
In carloads, spot	1.35	@	1.37
tank cars	1.29	@	—
Oil palm, Lagos lb.	.10¼	@	—
Niger	.10½	@	—
pine, yellow gal.	1.00	@	—
distilled gal.	1.25	@	1.35
rapseed, refined gal.	1.45	@	—
rapseed, blown gal.	1.55	@	—
rosin, first rectified gal.	.74	@	—
second run	.77	@	—
tar (commercial) gal.	.38	@	.40
Oleum Acid, 20 per ct. ton	28.00	@	30.00
Orange mineral, Amer. lb.	.15½	@	.16½
imported lb.	Nominal		
Ozokerite	Nominal		
Paraphenylenediamine lb.	2.70	@	2.85
Petrolatum, bbls., amber. lb.	.06	@	.07
pale yellow lb.	.07½	@	.08½
Paranitrosodimethylanaline	—	@	—
Parafin, refined, 118 @ 120 m. p.	.11¼	@	—
127 @ 129 m. p.	.10½	@	—
137 @ 140 m. p.	.12	@	—
Phenol	.12	@	.16½
Pumis	.05	@	.10
Pine tar kiln bbl.	15.00	@	—
Pitch bbl.	10.50	@	—
Plaster of paris bbl.	4.25	@	5.00
Red Tuscan lb.	.22	@	.30
red (American) lb.	.15	@	.16
Indian (English)	.15	@	.16
Standard lb.	—	@	—
Rosin (common to good)—280 lbs.	14.50	@	—
Rotten stone, powdered lb.	.02½	@	.04½
Rubber, substitute, black. lb.	.13	@	.17
white lb.	.15	@	.24
brown lb.	.20	@	.25
Rosin Oil, first rectified	.74	@	—
Second rectified	.77	@	—
Third rectified	.93	@	—
Fourth rectified	1.03	@	—
Soda ash, light, 58 pct. cwt.	3.10	@	3.30
Sodium Nitrite 96@98 pct.	.16	@	.17½
Solvent Naptha, crude, hvy.	.30	@	.35½
Soya Bean Oil, bbls. lb.	.13¼	@	.13½
Sellers, tanks, f. o. b. Coast	.08½	@	—
Stearic Acid, single	.21	@	—
Shellac, fine orange lb.	Nominal		
Sulphur Chloride, drums	.06½	@	.16
Shellac			
T. N. lb.	1.15	@	1.20
Bleached, ordinary lb.	1.05	@	1.15
Bleached, bonedry lb.	1.30	@	1.40
Silex (silicia) ton	25.00	@	40.00
Soapstone, powdered ton	15.00	@	20.00
Starch, corn, powd. cwt.	5.12	@	—
pearl	4.97	@	—
Jap potato, duty pd, lb.	.06½	@	.07
Sulphur, crude ton	—	@	—
100 pounds	—	@	—
roll	3.45	@	—
commercial superfine	2.10	@	2.35
Talc, American ton	18.00	@	20.00
French ton	30.00	@	—
Thiocarbanilid	—	@	—
Toluol, pure, in drums gal.	.35	@	.40½
commercial	.30	@	.32
Tripolite earth lb.	.01½	@	—
Turpentine, pure gum—spirit gal.	1.49	@	—
wood gal.	1.48	@	—
Venice, artificial gal.	.15	@	.16
true	3.25	@	3.30
Vermilion, English lb.	1.60	@	—
American	.25	@	.30
Vorite	Nominal		
Wax, beeswax, crude yel. lb.	.24	@	.26
refined	.33	@	.50
Bayberry	.37	@	.39
ceresin, white lb.	.15	@	.16
yellow	.14	@	.15
Whiting, commercial cwt.	1.40	@	—
Gilders Bolted	1.45	@	—
Paris white, Amer. cwt.	1.75	@	—
English cliffstone cwt.	2.00	@	—
Xylol (gal.) pure	.45	@	.50½
Commercial	.30	@	.35½
Zinc Oxide, French process, red seal	.11½	@	.11¾
green seal	.12½	@	.12¾
white seal	.13½	@	.13¾
Leaded Grades—			
Commercial, lead free	.09½	@	.10
5 per ct. lead sulphate	.09	@	.09¼
10 per ct. lead sulphate	.08¾	@	.09¼
20 per ct. lead sulphate	.08½	@	.09
35 per ct. lead sulphate	.08¼	@	.09⅛
Zinc Sulphate	.03½	@	.04½

Crude Rubber

NEW YORK, SEPT. 7, 1920

Crude rubber continues to display an easy tendency, and the trend the past three weeks has been steadily downward. Goods are accumulating on spot, and importers are collecting large stocks for which there is no immediate outlet. Some little activity within the importing trade itself has been in evidence during the fortnight, but these transactions have been small and have been brought about by covering activity by temporarily short interests.

Tire manufacturers are not in the open market for any crude, and are even arranging for deferred deliveries of contract rubber. A bearish tone developed toward the closing of the last month, when rubber manufacturers informed the importing trade that they were not in a position to accept delivery of contracts maturing around September 1. While the manufacturers have not actually cancelled their contracts, they are arranging for the postponement of the deliveries for periods ranging from 30 days to two months, the delay being dependent upon the situation affecting individual manufacturers.

In view of these delayed deliveries, the usual amount of covering buying incidental to a period when contracts have been maturing, was absent at the beginning of the new month, and the market went into a still further slump. Prices have broken on all grades, as will be seen in the table in the next column.

The trade is looking for better times in the industry during the remainder of the year, and it is generally felt that Labor Day has marked the turn of the market. Business has not increased appreciably, but importers feel that the suspensions in the tire manufacturing industries, and allied lines, must soon come to an end. Figures are cited to show that there will be an actual need for a resumption of tire making before the year is out, and it is upon these figures that the crude dealers are basing their hopes for a stronger market. While it is conceded that there has been some overproduction of rubber, it is argued that the present situation has been brought about, not so much by an overproduction of the crude, as by an underconsumption of rubber. Conditions will right themselves, the trade believes, when manufacturing picks up and a stronger market is anticipated. In the meantime, prices continue at the lowest levels in the history of the industry.

Ceylons			
Smoked sheets ribbed, spot	.27	@	.27½
Smoked sheets ribbed, Sept.	.27½	@	—
Smoked sheets ribbed, Oct.-Nov.	.29½	@	—
Smoked sheets ribbed, Jan.-June	.35	@	—
Smoked sheets plain, spot	.25	@	.25¾
First latex pale crepe	.28¾	@	.29¼
Amber crepe, No. 1	.27½	@	.28
Amber crepe, No. 2	.26½	@	.27
Amber crepe, No. 3	.25½	@	.26
Clean brown crepe	.26	@	—
Light clean brown crepe	.25	@	—
Roll brown crepe	.23½	@	.24
Grand Central crepe	Nominal		
Africans			
Rio Nunez string	—	@	—
No. 1 Benguella	.17	@	—
No. 2 Benguella	.14	@	—
Paras			
Up-river fine	.29½	@	.30
Up-river medium	.27	@	.27½
Up-river coarse	.19¾	@	.20½
Caucho ball	.20½	@	.21
Islands fine	.27	@	.28
Islands coarse	.18	@	—
Maderia fine	.34	@	.35
Knapsack	.40	@	.42
Centrals			
Corinto prime	.18	@	.19
Esmerelda prime	.17	@	.18
Miscellaneous			
Guayule wet	Nominal		
*Balata block Panama	.45	@	—
Balata sheets	.71	@	—
Cameta	.17	@	.17¾
Palembang	.08½	@	.09
Prime Surinam sheets	.34	@	—

*Nominal

Scrap Rubber

NEW YORK, SEPT. 7, 1920

Scrap rubber prices have been carried lower from day to day by fractional declines, and the market is at present in a state of stagnation, as far as business is concerned. Reclaimers have not yet shown any revival of interest in the offerings of the wholesalers and stocks continue to pile up in the hands of the latter. Jobbers have been reducing the prices paid to the collectors almost from day to day, but still the goods continue to flow in, keeping the market in a very overstocked condition.

Normally, the trade looks for a little buying to set in after Labor Day, but such a demand has not yet come this year, and sellers are not looking for any increase in demand until later on in the fall.

	Cents per Pound.		
Truck Tires	3.00	@	3.25
Black Rubber	1.50	@	2.00
Boots and shoes	6.00	@	6.25
Arctics, trimmed	5.00	@	5.12½
Arctics, untrimmed	5.00	@	—
Tires—Automobile	2.00	@	2.25
Bicycles, pneumatic	1.12½	@	1.62½
Mixed hose	1.00	@	1.25
Air brake	—	@	—
Inner Tubes, No. 1	10.00	@	10.50
Inner tubes, No. 2	6.00	@	6.50
Red Tubes	6.00	@	6.50

Cotton Declines in August

The Crop Reporting Board of the Bureau of Crop Estimates of the United States Department of Agriculture estimates, from the reports of the correspondents and agents of the bureau, that the condition of the cotton crop on August 25 was 67.5 per cent of a normal, as compared with 74.1 on July 25, 1920, 61.4 on August 25, 1919, 55.7 on August 25, 1918, and 68.2, the average on August 25 of the past ten years.

A condition of 67.5 on August 25 forecasts a yield per acre of about 174 pounds and a total production of about 12,783,000 bales. That is, the final outturn will probably be larger or smaller than this amount according as conditions hereafter are better or worse than average conditions. Last year the production was 11,329,755 bales, two years ago 12,040,532 bales, three years ago 11,302,375, four years ago 11,449,930, and five years ago 11,191,820 bales.

The board gave out the following statement:

"Remarkable growth took place during August, but the crop is from two to three weeks late and a late fall is necessary for favorable termination of the crop. Boll weevil damage will be greater than usual."

Comparisons of crop conditions by States follow:

	August 25.			
State	1920.	1919.	1918.	1910-19. Avge.
Virginia	81	67	84	83
North Carolina	79	70	77	74
South Carolina	71	67	67	71
Georgia	58	55	66	70
Florida	57	38	60	69
Alabama	58	55	66	67
Mississippi	60	61	67	68
Louisiana	55	47	53	64
Texas	67	61	43	65
Arkansas	75	65	52	72
Tennessee	75	69	58	77
Missouri	83	75	60	77
Oklahoma	84	71	33	67
California	80	98	92	95
Arizona	86	90	96	—
Other	90	—	—	—
United States	67.5	61.4	55.7	68.2

The estimated cotton crop for 1920 compares with other years as follows, with the Government's December estimate in other years, the final Census Bureau's estimate and the final commercial estimate in previous years. Figures represent bales of 500 pounds, the first two columns excluding linters, the other including them:

	Agr. Dept. Dec. Est.	Census.	Comm'l
1920	*12,783,000		
1919	11,030,000	11,329,755	
1918	11,700,000	12,040,532	11,360,000
1917	10,949,000	11,302,375	12,737,000
1916	11,511,000	11,449,930	12,737,000
1915	11,161,000	11,191,820	12,862,000
1914	15,966,000	16,134,930	15,136,000
1913	13,677,000	14,156,486	14,552,000
1912	13,820,000	13,703,421	14,104,000
1911	14,885,000	15,692,791	16,101,000
1910	11,426,000	11,608,616	12,075,000
1909	10,088,000	10,004,919	10,513,000
1908	12,920,000	13,241,799	13,817,000
1907	11,678,000	11,107,179	11,441,000
1906	12,546,000	13,273,809	13,540,000
1905	10,168,000	10,575,017	11,234,000
1904	12,162,000	13,438,012	13,654,000
1903	9,962,000	9,851,129	10,011,379
1902	10,400,000	10,784,473	10,725,422
1901	9,674,000	9,748,646	10,662,995
1900	10,100,000	10,245,602	10,401,453
1899	8,900,000	9,507,786	9,142,838

*This month's estimate.

The area of cotton planted in 1920 and preceding years has been as follows:

	Acres.		Acres.
1920	35,504,000	1915	32,107,000
1919	35,133,000	1914	37,406,000
1918	37,073,000	1913	37,458,000
1917	34,925,000	1912	34,766,000
1916	36,052,000	1911	36,681,000

Rubber Industry Statistics

The Rubber Association of America, Inc, has recently sent to its members the statistics compiled from the returns to Questionnaire No. 101 covering sundry information concerning the rubber manufacturing industry for the first six months of 1919. The following bulletin accompanied the statistics:

August 6th, 1920.

To Firm Members:

Gentlemen:—

There are enclosed two copies of the statement embodying a summary of the returns made by rubber manufacturers and reclaimers to Questionnaire No. 101, covering the first six months of 1919.

The information presented represents totals for the number of manufacturers and reclaimers reporting the data for their companies and is submitted as an entirety without any attempt to make an estimate as to the approximate totals for all firms to whom the questionnaire was sent.

In this connection, we are much gratified to be able to direct attention to the fact that the response to Questionnaire No. 101, while slower than we hope it will be in the future, is finally considerably more complete than was the response to the previous Questionnaire, No. 100, the exact figures being 153 returns to Questionnaire No. 101 vs. 103 to Questionnaire No. 100, both out of a total of approximately 270 firms to whom each questionnaire was sent.

A new questionnaire, No. 102, covering the latter half of the year 1919 is being sent you at this time, and we wish to take this opportunity of urging that the response to this questionnaire be as prompt and complete as is possible, in order that information for the entire year may be available in the very near future.

The statistics are as follows:

Number of firms to whom questionnaire was sent	273
Number of firms responding	163
Number of firms reporting statistics	153
Average Total Daily Number of Employees	166,103

	Reported by Mfrs. who also reclaim (18)	Reported by Reclaimers solely (10)	Total	Approx. Amt. Scrap used per pound of Reclaimed Produced
No. of pounds Reclaimed Rubber Produced from Raw and Cured Scrap	25,861,345	57,515,312	83,376,657	1 lb., 5 oz.
No. of pounds Scrap Rubber (including raw and cured scrap) Consumed in Production of Reclaimed Rubber	31,928,556	80,922,149	112,850,705	1 lb., 5 oz.

Number of Pounds of Crude Rubber Consumed in the Manufacture of Rubber Products and Total Sales Value of Shipments of Manufactured Rubber Products

Product	Number of pounds Crude Rubber Consumed		Total Sales Value of Shipments of Manufactured Rubber Products	
Tires and Tire Sundries:				
Automobile and motor truck casings	103,926,192		$94,329,257	
Automobile and motor truck tubes	22,272,497		27,246,850	
Solid tires	11,686,767		7,889,941	
Other tires and tire sundries	6,523,726		6,466,243	
*TOTAL—Tires and Tire Sundries		145,538,745		$307,403,497
Other Rubber Products:				
Mechanical Goods	10,053,317		$45,042,163	
Boots and Shoes	14,301,480		46,617,582	
Other Products	6,695,533		27,888,645	
*TOTAL—Other Rubber Products		31,159,003		$127,756,611
GRAND TOTAL—ALL PRODUCTS		176,697,748		$435,160,108

*NOTE—It should be noted that the above totals of "Tires and Tire Sundries" and "Other Rubber Products" include some figures which are not shown under the various items, which is due to the fact that some of the reports received were not itemized.

American Rubber Patents

Issued August 17, 1920

1,349,560—To Henry Z. Cobb, New York, N. Y., assignor to The Mechanical Rubber Co. Process and apparatus for producing a hollow rubber biscuit.

1,349,572—To Clarence W. Hubbell, Naugatuk, Conn., assignor to The Goodyear's India Rubber Glove Manufacturing Company. Boot.

1,349,626—To Walter R. Peterson, Milwaukee, Wis. Tire-tread attachment.

1,349,688—To Oliver Nichols, Mound Valley, Kans. Tire and tube vulcanizer.

1,349,693—To Winfield S. Robinett, Oakland, California. Vulcanizing apparatus.

1,349,721—To Ernest Hopkinson, New York, N. Y. Apparatus for use in vulcanizing pneumatic-tire casings for vehicles.

1,349,796—To Dirk Frans Wilhelmi, Doorweth, Netherlands. Vulcanizing-mold for boots and shoes.

1,349,898—To Melvon A. Marquette, Springfield, Mass., assignor to the Fisk Rubber Company, Chicopee Falls, Mass. Reinforcement for tire-beads.

1,349,902—To Thomas Midgeley, Springfield, Mass., assignor to the Fisk Rubber Company, Chicopee Falls, Mass. Tire-bead.

1,349,911—To William Beach Pratt, Wellesley, Mass., assignor to E. H. Clapp Rubber Company, Boston, Mass. Vulcanized article and process of producing the same.

1,349,912—To William Beach Pratt, Wellesley, Mass., assignor to E. H. Clapp Rubber Company, Boston, Mass. Article and process of bonding metal and vulcanized rubber.

1,349,913—To William Beach Pratt, Wellesley, Mass., assignor to E. H. Clapp Rubber Company, Boston, Mass. Pneumatic tire and process of making same.

1,349,914—To William Beach Pratt, Wellesley, Mass., assignor to E. H. Clapp Rubber Company, Boston, Mass. Solid tire and method of making the same.

1,350,117—To John Schmidt, New Brunswick, N. J., assignor to Howe Rubber Corporation, New Brunswick, N. J. Bead-forming ring for holding pneumatic tires.

1,350,216—To George F. Fischer, Rochester, N. Y. Shoe-heel.

Issued August 24, 1920

1,350,332—To John R. Pettit, New York, N. Y. Rubber heel.

1,350,696—To Oscar F. Peck, Lawndale, and James W. Speers and Robert R. Jones, Akron, Ohio, assignor to Firestone Tire & Rubber Co., Akron, Ohio. Vulcanizing apparatus.

1,350,798—To Willis A. Gibbons, Flushing, N. Y., assignor to American Rubber Company. Process for vulcanizing rubber and similar materials.

1,350,931—To Warren MacPherson, Cambridge, Mass. Rubber shoe-bottom.

1,350,995—To Hans E. Grabau, Long Island City, N. Y., assignor to A. Charles Schwartz, New York, N. Y. Vehicle-tire.

Dayton Rubber to Make Tubes

The Dayton Rubber Manufacturing Company, of Dayton, Ohio, is preparing to manufacture inner tubes in addition to its regular line of pneumatic and airless tires.

United States Packings

RAINBOW Sheet Packing was the original red sheet on the market. For 30 years it has held the confidence of the mechanical world.

More than 35,000,000 pounds have been used since the first batch was produced. It has never failed where the mechanical conditions are correct and the steam temperature 370 degrees and under.

All Rainbow Sheet is red, but all red sheet is not Rainbow. Identify the genuine by its trade-mark--three rows of diamonds running lengthwise through each roll, as well as the Company's Seal which is the mark of quality.

United States Rubber Company

1790 BROADWAY NEW YORK

The World's Largest and Most Experienced Manufacturer of Mechanical Rubber Goods

BELTING	HOSE	PACKINGS	MISCELLANEOUS
Transmission *"Rainbow," "Pilot" "Shawmut"–"Giant Stitched"* **Conveyor** *"United States," "Grainster"* **Elevator** *"Matchless," "Granite," "Grainster"* **Tractor** *"Sawyer Canvas" "Little Giant Canvas"* **Agricultural** *"Rainbow," "Bengal" "Grainster," "Sawyer Canvas"*	**Air** *"4810," "Dexter"* **Steam** *"Rainbow," "Giant," "Perfected"* **Water** *"Rainbow," "Mogul," "Perfected"* **Suction** *"Amazon," "Giant"* **Garden** *"Rainbow," "Mogul," "Lakeside"* Also Hose for Acetylene, Oxygen, Acid, Air Drill, Auto Radiator, Car Heating, Air Brake, Gasoline, Oil, Hydraulic, Chemical, Coke, Creamery, Discharge, Vacuum, Sand Blast, Spray, etc.	**Sheet** *"Rainbow," "Vanda," "Paramo"* **Rod** *"Wizard," "Rainbesta" "Peerless," "Honest John," "No. 573" and hundreds of other styles in coils, rings, gaskets and diaphragms—* **Usco Valves—** **THE RIGHT PACKING IN THE RIGHT PLACE**	**Mats, Matting and Flooring, Plumbers' Specialties, Rubber Covered Rolls, Friction Tape, Splicing Comp'd. Dredging Sleeves, Hard Rubber Goods, Printers' Blankets, Tubing, Soles, Heels, Jar Rubbers, Moulded Goods**

UNITED STATES RUBBER COMPANY AND ASSOCIATED COMPANIES — US RUBBER SYSTEM

RESULTS COUNT

An advertiser in the Classified Columns of THE RUBBER AGE recently got 24 replies to his advertisement for a factory superintendent and writes us that he is "indeed well pleased with the results."

HERE IS THE LETTER

"On June 10th we advertised in your issue of THE RUBBER AGE for a factory superintendent. We are indeed well pleased with the result as we have received to date twelve answers,* all good ones, from which we hope to fill our wants. Should we find ourselves in need of additional help we will remember your publications, knowing we are assured of good results."

(Name on Request)

*Since the above letter was written the number of answers has increasd to 24.

This concern, like others, has found the *proper* medium through which to reach the rubber trade. Another advertiser needing factory executives received twenty-two answers and numerous other such cases might be cited to show that the--

Classified Advertisements in
THE RUBBER AGE
Are Used for Results
And Read for Results

What have you for sale? Do you need capable men for your plant? Do you need used machinery or a new plant?

Use THE RUBBER AGE for Results

"BROOKLYN BRAND"
VELVET

SULPHUR

GUARANTEED

100% PURE

and

FREE FROM GRIT, OIL AND ACID

for

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BATTELLE & RENWICK
Established 1840
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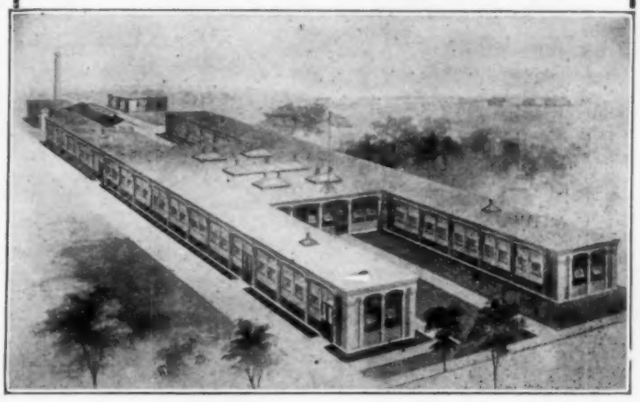
HYDE MFG. CO.

Experts on Cutlery

Write for our R Catalogue for Rubber Manufacturers.

NEW YORK OFFICE
41 Union Square, W.
Factory, Southbridge, Mass.



"For your tires sake"

Price $1.50

Schrader

The demand for Schrader gauges grows in direct proportion with the increase in the number of car users.
Keep this in mind when figuring your requirements.

A. SCHRADER'S SON, Inc.
Atlantic Ave. Brooklyn, N. Y.

H&G

H&G

Do you know what benefits are secured by curing with

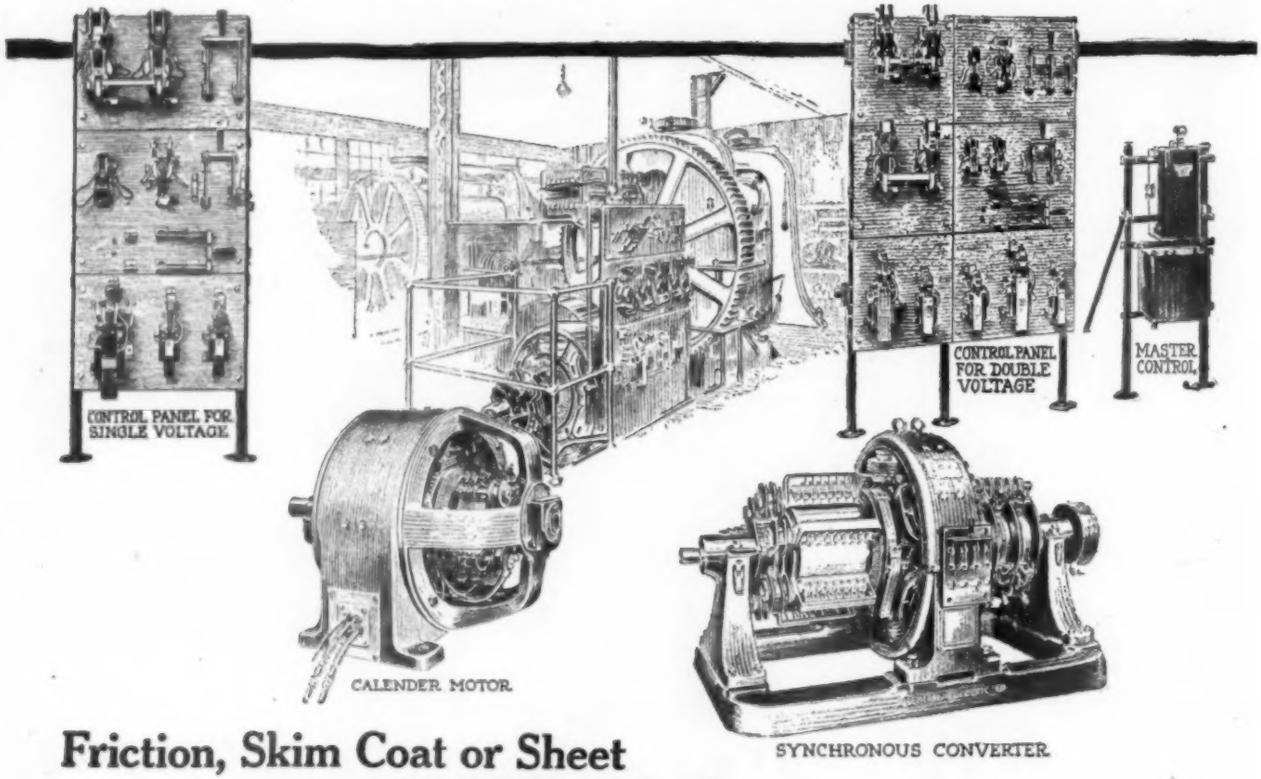
ANTIMONY SULPHURET ?

THE HARSHAW FULLER AND GOODWIN CO.

Cleveland
Chicago Philadelphia New York

H&G H&G

G-E Motor Drives eliminate uncertainty and thus greatly reduce losses due to waste and seconds



Friction, Skim Coat or Sheet at Any Speed You Need

G-E Calender Drives for either 115-230 volt—3 wire or 230 volt single voltage operation consist of a motor, control panels, emergency stop switch and push button stations with necessary resistances, all combined into a simple drive unit.

Moving controller handle starts the automatic acceleration of the motor. This operation continues at a rate which safeguards the motor, no matter how fast controller handle is moved.

If the double voltage equipment is used eighteen speeds are available on the lower voltage and eighteen additional speeds can be obtained on the higher voltage.

The "quick stop" device is operated by a rope or cross bar which is placed within convenient reach of operator.

When either the "quick stop" device or "safe stop" buttons shut down the motor, the latter cannot be started up until the stopping device is reset.

Our specialists will be pleased to tell you of other features of these drives.

Consult our nearest office for information on complete line of electrical equipment for Rubber Mills.

General Electric Company

General Office Schenectady, N.Y.

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